METAL INDUSTRY

ELECTRO-PLATERS REVIEW
BRASS FOUNDER AND FINISHER
COPPER AND BRASS
ALUMINUM WORLD

VOL. 34 NEW YORK, FEBRUARY, 1936 No. 2

A History of the American Crucible Business

The First Complete, Authentic Story of this Fascinating Industry, From Its Inception in 1827, to 1936.

By JONATHAN BARTLEY

JONATHAN BARTLEY is the dean of the crucible and graphite industry. His long association with it, together with the many interesting and instructive articles he has written on the subject have made his name familiar to everyone in any way, directly or indirectly, connected with graphite and its uses, anywhere in the world. His expert knowledge of graphite is based, not only upon the length of his experience, but upon the variety of the work which he has done. We are proud to have the privilege of presenting the first authentic history of the American crucible business from the pen of Jonathan Bartley.—Ed.

JONATHAN BARTLEY

FOR a long time there has been a feeling among the crucible fraternity that something authentic (or as nearly authentic as possible) should be written to put on record the early history of the crucible business, a business which has played a highly important part in the building up of many of America's largest industries. This story is written for that purpose. Many things have been written and told about the origin and development of the American graphite crucible, but most of these were based on hearsay and perhaps polished up more or less from imagination. The writer has had to discard many things he had been led to believe were true recitals since he began delving into the few remaining relics that can be gathered together to throw light on the actual events that followed the introduction of graphite into a crucible by Joseph Dixon away back in 1827. In the writing of history, where many of the events occurred 100 years before, there is always a chance for error, particularly in dates, when all the writer has to build on is a mass of antiquated letters that were gathered up from different sources, many of them minus a destination. However, by carefully matching one with another it has been possible to weld a perfect chain so that our story can be accepted as being substantially correct.

Joseph Dixon and His Early Work

Joseph Dixon was born at Marblehead, Mass., in 1799. Marblehead was a small town in the heart of Yankeedom and Dixon inherited every attribute that was ever attached to the word Yankee. He was a born genius; history has recorded and credited him with many inventions outside the graphite crucible. He was one of the world's outstanding men of his day. His biography makes very interesting reading but that belongs to another story. Right now we are interested in him only as the inventor of the American graphite crucible and in the events that followed his work from the time he began his crucible experiments in Salem, Mass., in 1827 until he came to Jersey City in 1847 to build the plant there that will forever perpetuate his name.

We find Dixon at 28 years of age in his little shop in Salem. There is nothing that we can find to show just what he was doing. A letter written to the Dixon company in 1907 by a man whose father had a shop in Salem adjoining that of Dixon relates several things which would indicate that his work was in metal where the "Dutch" crucible (clay) played an important part. This writer states that the first graphite crucible was tested out in his father's shop. It was probably when some samples of graphite fell into his hands that Dixon's mind turned to crucibles. Just how these samples came to him is told in an article in the Jersey City Times of September 11, 1869, following Dixon's death. From this we excerpt the following:

> "An East Indian ship sailing from Salem brought along with coffee, gum, etc. a sample of Ceylon graphite which was not considered of any value. Mr. Dixon induced a captain by the name of Rogers to bring in a larger sample, etc."

The U. S. Geological survey corroborates this to a large extent in the report of Mr. E. S. Bastin in 1913. Mr. Bastin writes: "Although their (the mines) existence was known in early times and mentioned in print as early as 1691 the graphite deposits of Ceylon were not exploited until some time between 1820 and 1830. Joseph Dixon is said to have imported a small quantity in 1829." All these things point to and establish beyond any doubt that Joseph Dixon was the inventor of America's first graphite crucible, and that his experiments started in Salem.

He left Salem around 1830-31 and went to New Bedford. An article in the Jersey City Times that was printed only a few years after these events happened, states specifically:

> "From Salem he went to New Bedford where his works were destroyed by fire without insurance. He then went to Taunton, Mass. From there he went to Mystic, Conn., where he failed, and then came to Jersey City in 1847."

There is a well founded story that when he first came to Taunton he had a shop on Ingell Street along the river, but the only recorded fact is that he formed a partnership with Charles R. Atwood and Charles R. Vickery under the trade name of Dixon, Atwood & Vickery. Their shop was in a building on School Street that was built by Isaac Babbitt and occupied by him during his early experiments that gave the world the widely known alloy called Babbitt Metal. There is nothing to tell us how long this partnership lasted, but judging from what we have heard about the temperaments of both Dixon and Atwood, it is fair to assume it didn't last many years.

After Dixon left Taunton he probably went to Ceylon. We find one letter that refers to a visit there. When Henry L. DeMel from Colombo visited the United States in 1925 he told the writer that Dixon had come to Ceylon in 1838 and had influenced his (DeMel's) grandfather by convincing argument to open up and operate the graphite deposits on the large DeMel estate. These mines later became the largest in the world. Mr. DeMel's story dovetails with the unaccounted time between 1835 and 1842 when we find Dixon at Mystic, Conn. He was still there in 1846 because we find a letter dated June 1st of that year from one William Wallace at 5 Sullivan Street, New York City, in which the writer compliments Mr. Dixon on the "Mystic" pot. According to the story in the Jersey City Times Dixon "went broke" there and this undoubtedly is true because that article was written to commemorate Dixon who had recently died and was written by one who had the facts at hand. This concludes the early work of Dixon and brings him to Jersey City.

The Joseph Dixon Crucible Company

When Dixon came to Jersey City and built a little shop on the corner of Monmouth Street and Railroad Avenue, little did he think he was laying the foundation for the greatest graphite industry the world has ever known. To write its achievements would mean the writing a library, but that belongs elsewhere. The first shop was equipped with one grinding mill, one mixer, three spinning wheels and one small kiln. In the beginning the crucibles were spun up by hand. There were three "turners," William Van Horn, Robert J. Taylor and Frederick Strow. Mr. Van Horn remained with the Dixon company until 1906 when he was pensioned on account of old age, and we are indebted to him for the data now being given. Hand turning only lasted one year. The appearance

of a "jigger" threw the turners into a state of rebellion and for a week or two Dixon had a strike on his hands. This however was settled without any "New Deal" and the little plant grew slowly but steadily. The business ran under the name of Joseph Dixon until in the late 1850's when Orastes Cleveland married Dixon's daughter and then it was changed to Joseph Dixon & Company with Cleveland taking an active interest in the business.

Cleveland was a born politician. He was elected Mayor of Jersey City for three consecutive terms and served one term as Congressman. Dixon died in 1869 and after his death Cleveland gave more attention to politics and less to business. The company became heavily involved in debt which finally led to a receivership in 1880. At that time Edward F. C. Young was a cashier in the First National bank in Jersey City and the Court appointed him Receiver. Then followed several years of litigation with Cleveland trying to get control. The case was ended in 1888 giving Mr. Young full power to reorganize. It was then that John A. Walker appeared on the crucible screen. Mr. Walter held the job of bookkeeper during those years of litigation and when the reorganization took place he was made Vice President and General Manager. In 1894 the crucible plant was practically rebuilt and the first decade in the present century found the plant running 15 jiggers on full time with occasional overtime. Mr. Walker died in 1907 and his mantle went to the shoulders of J. H. Schermerhorn who is at this time Vice President and General Manager. Mr. Young died in 1908 and his son-in-law George T. Smith was elected President and he still is in command.

The Phoenix Crucible Company

This company was organized in 1844 by Charles R. Atwood and Charles R. Vickery who were in partnership with Dixon on School Street in Taunton. It was probably when they required a larger plant that they erected a building on Water Street in that section of Taunton known as Weir Village. They incorporated in 1851 and it was then that Henry D. Atwood, son of Charles R., was taken into the firm. After his father's death a few years later, Henry D. became sole owner of the Phoenix Company. According to the many stories told about him, Henry D. played a very spectacular part in the crucible drama. Nothing much was told about him until the Taunton Crucible Company began to farm in the crucible field. It was when they started to make crucibles in a building on Water Street almost directly opposite the Phoenix plant that real resentment was shown. The bitter feeling between the two firms spread to the workers who frequently wrestled for supremacy in the street. An amusing story is told about how Henry D. "traded" in some of the Taunton stock. The story goes that he purchased three (3) shares of this stock from the Williams Stove Company and that these shares were continually on the market and always "for sale cheap." A large sign was placed in a window of the Phoenix office with this offer and occasionally it would be offered in a public sale on the Public Square. On the day of sale a tally-ho with a brass band would appear with signs on both sides that read: **"Taunton Crucible Stock Will Be Sold Today on the Square."** After a parade through the principal streets the caravan would stop in front of the Taunton Crucible Company's office and the band would play, "I Dreamed I Dwelt in Marble Halls" and "Should Old Acquaintance Be Forgot," and then proceed to the Square where an auctioneer would offer the stock to the "highest bidder." Of course it was never sold. This story was told the writer by two men who witnessed much of it. One of them worked for Phoenix, the other for Taunton, and both are still living.

In 1865 the Phoenix Company established a branch plant in Jersey City. It was known as The Jersey City Crucible Manufacturing Co. Land was located on Bay Street near Greene. This plant was in charge of W. T. MacFarlane who later on organized the Bridgeport Crucible Company. The Jersey City plant continued until 1878 when their entire stock of crucibles was offered to the trade for one and one-half cent per number.

In 1898 the American Smelting & Refining Company bought the Phoenix plant in Taunton and retained Mr. Atwood as manager. They continued the business until 1901 and then sold it to the Taunton Crucible Company. Notwithstanding Mr. Atwood's eccentricity he was a very able man and the Phoenix company occupied a prominent place on the crucible map at one time.

Gautier Crucible Company

J. H. Gautier & Company was founded in 1858 by Dr. Josiah H. Gautier, a physician and chemist. When Joseph Dixon came to Jersey City in 1847 Dr. Gautier did a lot of analytical work for him and the co-operation given by him in the early experiments entitles Dr. Gautier a place alongside Dixon for the honor of invention. The Gautier business was not incorporated until 1890, the officers then being Josiah H. Gautier, President; Charles E. Gregory, Vice President; Charles E. Gautier, Secretary and Treasurer, with David R. Daily, General Manager. In 1894 Charles E. Gautier resigned as a director and Dudley G. Gautier took his place while Mr. Daly was advanced to Secretary and Treasurer. Dr. Gautier died in 1895 and Mr. Gregory was made President; Mr. Daly, Vice President and Treasurer, and DeWitt C. Abernethy, Secretary. Charles E. Gautier died in 1900. Mr. Gregory died in 1917 and David R. Daly succeeded him as President and Dudley G. Gautier moved up to be Vice President, with Mr. Abernethy, Treasurer and Albert E. Acheson, Secretary. Dudley Gautier died in 1918, and the year following Mr. Daly died. In the reorganization following Mr. Daly's death, Walter C. Witherbee was elected President; Ernest F. Tyler, Vice President and Mr. Acheson became General Manager. Mr. Witherbee died in 1922 and then Oliver W. Bird became the head of the company. Mr. Bird resigned and Silas H. Witherbee assumed the Presidency while George Gunderson became General Manager. This was in 1927 and the present organization stands with Mr. Witherbee still President, Ernest F. Tyler, Vice President, Charles E. Gautier, Treasurer and George Gunderson, Secretary and General Manager.

The Gautier company experienced two fires, the first on October 27, 1892 and the second and most disastrous, on March 24, 1906 when the plant was running to full capacity on unfilled orders. The plant is located at Greene and Essex Streets, Jersey City, New Jersey.

The Taunton Crucible Company

Organized in 1866 by William H. Phillips and Venie Staples of the old Staples Coal Company, the Taunton Company always remained a close corporation although it changed management many times. It was here that James M. Westgate of the Bay State company made his crucible debut some forty years ago. Edwin D. Paige left the Taunton management to build a plant of his own. W. T. MacFarlane became its manager after several years association with Phoenix and Arthur J. Willard who began his crucible career with Phoenix managed Taunton's business in its later days and until the end in 1917. In 1906 W. T. MacFarlane bought the controlling interest in the Taunton plant and later on became the sole owner. It was carried on in conjunction with his Bridgeport plant and sold with the same to the Buffalo Brass Company in 1917. In 1901 Taunton bought the Phoenix plant from the American Smelting & Refining Company and either enlarged it or built new and abandoned the old plant, continuing their business on the Phoenix site. The closing of Taunton's doors removed a star actor from the crucible stage. Even Joseph Dixon couldn't boast of having tutored more scholars.

The R. B. Seidel Crucible Company

This company like many others sprung from the roots of Joseph Dixon's tree. Two of its founders were hand turners for Dixon in Jersey City. In 1866 Robert J. Taylor and Frederick Strow left the Dixon's shop and went to Philadelphia where they interested Henry Vile and Reuben B. Seidel in building a crucible plant. Their operations began at 1334 Callowhill Street under the name of Taylor, Strow & Company. This partnership continued until 1871 when Taylor withdrew to build a plant of his own. The firm name was then changed to Strow, Vile & Company. Strow died a few years after this and the name was again changed, this time to Vile, Seidel & Company. In 1881 Mr. Vile retired and Reuben B. Seidel became the sole owner. The business ran under the name of R. B. Seidel until his death in 1892. It had grown to a considerable proportion under Mr. Seidel's management and the progressive spirit that was in him was handed down to his four sons who continued the business. Edgar B., being the older, managed the business until he withdrew in 1897 to build the Tacony Plant, and then Henry C. and Horace Y. took over the management and carried it along, still under the old name until 1900 when they incorporated under the name of R. B. Seidel Inc., Philadelphia Black Lead Crucible Works with Henry C., President and Horace Y., Secretary and Treasurer. Henry died in 1921 and then Robert was made President and the business continued until 1926, when it dissolved and Horace was appointed trustee for the estate. He still holds that job. Thus ends one of the most outstanding and successful plants of its day.

Robert J. Taylor Crucible Company

When Robert J. Taylor withdrew from the firm then known as Taylor, Strow & Company in 1871 he built a plant at 1900 Callowhill Street in Philadelphia. The business was incorporated in 1897. Mr. Taylor died in 1903 and the business was continued until 1925 when it was closed by his heirs who had managed it after Mr. Taylor's death. It is unfortunate that more cannot be written about this successful crucible concern, particularly when it can be shown that success in business cannot be credited to man alone. By request we have been asked to exclude much that would make a very interesting story and we therefore bow our respects to a lady.

Ross-Tacony Crucible Company

The Ross-Tacony Crucible Company was established in 1871 by Henry A. Ross and a Mr. Hofferkampt. Among the oldtime crucible makers it was generally understood that Mr. Ross engaged in the making of stoppers before he began making crucibles and there are facts in our possession which point to one "Fritz" Hofferkampt who left Dixon around 1868-69 "to go with someone in Philadelphia who was making Black Lead plugs." At any rate Hofferkampt lived only a short time after the partnership was formed and then the brother of Mr. Ross, namely Christian K. Ross (who by the way was the father of Charlie Ross the first kidnapped child) bought the Hofferkampt interest and the firm name was changed to Ross & Company. They operated under the name of The Pennsylvania Crucible Works. Christian Ross did not take a very active part in the business until many years later. Henry A. Ross died in 1891 and then Christian Ross took over the business completely and continued to operate under the old name of Pennsylvania Crucible Works. Christian Ross died in 1897 and the business went to his son, Henry A. Ross (better known in the trade as Harry Ross).

During all of this period the firm was located at 6th and Jefferson Streets, Philadelphia, Pa. When the firm was first established in 1871, that section of the city was outlying and very much a rural settlement, but by 1900 this sparse corner of the city had grown to be very much of a residential section and the Pennsylvania Crucible Works were considered a nuisance in that locality due to the smoke, which the kilns threw off. Consequently, the firm was constantly annoyed by residents who protested that their property or properties were being damaged by the smoke and soot. This started Mr. Ross looking around for a place to build a new plant, and in the early part of 1902 he had just about decided to purchase a piece of ground near North Penn Junction (P. R. R.) in Philadelphia, when he heard that the Tacony Crucible Company (then owned by Edwin B. Seidel) was for sale. In July of that year a satisfactory arrangement was made whereby Ross & Company operating under the name of the Pennsylvania Crucible Works bought the Tacony plant and moved from 6th and Jefferson Streets in Philadelphia to Tacony, Pa. and combined the two names under the name Ross-Tacony Crucible Company. In 1903 Mr. F. B. Danehower was taken into the company to relieve Mr. Ross of the heavy responsibility that had been forced upon him due to the increase in business. Mr. Ross died in 1929 and his mantle fell to the shoulders of Mr. Danehower who was made President and Treasurer and who still holds both jobs. In the same year that brought Mr. Danehower to the company another asset was added when Charles C. Bacon took off his coat in the Ross-Tacony office and made his bow to the crucible world. Ross-Tacony have always held a very enviable position in the crucible fraternity because of their outstanding reputation for fair dealing.

McCullough-Dalzell Crucible Company

In Pittsburgh, Pa., on March 1, 1872, articles of agreement were drawn up to form a company to "manufacture and sell" Black Lead crucibles. It was signed by M. McCullough, John H. Dalzell, C. C. Arensberg and Harry E. Dubarry. The company was to be known as McCullough-Dalzell & Company and a plant built in Pittsburgh at 36th St. & A. V. R. R. According to the article of agreement Mr. Arensberg was to have full charge of all cash and accounts. Mr. Dubarry, with the assistance of H. H. Wallace was to have charge of the manufacturing. The records show that both Mr. Arensberg and Mr. Dubarry were sons-in-law of William B. Wallace who, as the record reads "was the first crucible manufacturer under the Dixon invention in America and the first in England." It would appear from this that the McCullough-Dalzell firm may have succeeded some other crucible concern but we have nothing to show this. H. H. Wallace was the son of William B. Wallace. In 1878 Mr. Arensberg acquired the stock or interest that was owned by Mr. McCullough, and about this time H. H. Wallace retired and a nephew took his place in the shop. In 1892 Messrs. Arensberg and Dalzell bought Mr. Dubarry's interest and the business continued as a copartnership, Mr. Arensberg having complete charge of affairs while Mr. Dalzell acted in the capacity of advisor until his death in 1894. In 1895 the company was incorporated and J. W. Dalzell who was a brother to John H. Dalzell, one of the organizers, was elected the company's first President, which office he held until his death in 1898. Following Mr. Dalzell's death Mr. Arensberg became President and General Manager. Mr. Arensberg died in 1924. He was succeeded by his son, E. E. Arensberg who had been Secretary for the company since its incorporation. He died in 1934 and then the company was reorganized with E. A. Clowes, President and Treasurer and C. P. Dile, Secretary, while the business continued under the old name.

Keystone Black Lead Crucible Works

George Strow was a younger brother of Fred Strow who, with Robert J. Taylor built the plant that afterward became the R. B. Seidel business. George began his crucible work with the Strow-Vile Company in 1871 and continued with that firm in its changing career until 1880 when he connected with Adam Newkumet who had a foundry at 1537 North Front Street in Philadelphia and began making crucibles under the name of Keystone Black Lead Crucible Works. The firm had limited capital as evinced by some letters which show that their buying was in small lots which were paid for in notes that quite frequently were protested. The business managed to go along for a couple of years and finally closed.

The Bridgeport Crucible Company

This company was organized in 1887. The real founder was W. T. MacFarlane who began his crucible career with the Phoenix plant in Taunton as a salesman. When the Phoenix Company established their Jersey City branch in 1865 MacFarlane went there to manage the office. When this plant was closed in 1878 he came back to Taunton and continued with Phoenix one year and then went over to the Taunton Crucible Company as salesman. Like others who had held a salesman's position with that plant he was promoted to manager. He held that position until 1887 when he withdrew and went to Bridgeport, where, with the financial support of Mr. E. G. Burnham, he built the Bridgeport plant. Mr. Burnham was the head of the old reliable firm of Eaton, Cole & Burnham who were large users of crucibles. The officers at the time of organization were E. G. Burnham, President; W. T. MacFarlane, Treasurer and W. A. MacFarlane, Secretary. W. A. MacFarlane was W. T.'s son. In 1907 the Bridgeport company bought the Taunton Crucible Company and ran it in conjunction with the home plant. In 1893 the Bridgeport plant had a fire that put the plant out of commission for several months but their Taunton plant took care of the trade. Both plants were in active operation during the World War and in 1917 both were sold to the Buffalo Brass Company for $1,500,000.

Tacony Crucible Works

Edwin B. Seidel was the oldest son of Reuben B. Seidel and the Manager of the R. B. Seidel plant after his father's death until 1897 when he severed his connection with the home plant to build a plant of his own. He selected Tacony, Pa., as the place to build his plant. This probably was due to the Disston Saw Works being located there with the natural assumption of getting their large crucible business. The plant was one of the most modern of its day and the cost put the business under a handicap from the start. In 1872 the load became too heavy to carry and the plant was sold to the Pennsylvania Crucible Works which afterwards became the Ross-Tacony Crucible Company.

Trenton Crucible Works

John Taylor was the son of Robert J. Taylor. After leaving school he associated himself with his father's business as a salesman. According to the story told, John proved a rather expensive asset due to his expensive traveling account. In 1900 he left the home plant and went over to Trenton, N. J., where he rented a small pottery that was vacant and started a crucible business of his own under the name of the Trenton Crucible Works. It lasted only a year when a receiver was appointed and the writer was called in to inventory the plant. Edwin B. Seidel, who was at that time operating the Tacony Crucible Works bought the few barrels of clay and graphite together with the few molds and other paraphernalia. John died out in California in 1928.

The Waterbury Crucible Company

This company was organized in 1904 by Edwin B. Seidel. Mr. Seidel was the son of Reuben B. Seidel and a member of the Seidel crucible family group until he built a plant of his own at Tacony, Pa. After he sold the Tacony plant he went to Waterbury, Connecticut and leased or bought a building on Meadow Street that had been used for wholesale grocers' supplies. His associates in the organization were L. S. Tenny and C. A. Kier and later on A. T. Force represented the interests of George Boardman who was said to be the majority stockholder. The business continued until 1909 when it was liquidated.

The Bay State Crucible Company, formerly the Paige Retort and Crucible Company

When Edwin D. Paige organized the Paige Retort & Crucible Company in 1907, it was probably because Taunton had always from the beginning held an enviable reputation with retort users, that the Retort preceded the Crucible in his selection of a name for his company. Fully 75% of all retorts made up to that time were made in Taunton and that branch of the industry is an important factor there today. Mr. Paige began his crucible work with the Taunton Company as a salesman. From this he became manager, which position he held until the Bridgeport Crucible Company got control of the Taunton plant. He resigned his position and bought a building in Weir Village that had been used as a pottery at one time. The plant began operations in the fall of 1907. Mr. Paige died in 1910 and then the management passed to James M. Westgate who had been shop superintendent from the start. Mr. Westgate began his crucible work with the Taunton Crucible Company in 1898 and stands today the third in rank of what might be called the remaining "Old Guard." The Paige Company was a close corporation. Franklin D. Williams who was a majority stockholder became actively interested after the death of Mr. Paige and it was due to his bull-dog tenacity that the company was able to weather some of the storms that were encountered. In 1912 the name was changed to Bay State Crucible Company. Mr. Williams died in 1934 and then the company was reorganized with William MacFadden, President; James M. Westgate, Vice President and Works Manager, with C. R. Hodges, Treasurer. Mr. MacFadden had been a Vice President and manager for the Chicago Crucible Company until that company merged with the Naugatuck Company.

The Jonathan Bartley Crucible Company

This company was organized and incorporated in 1908 by Lewis Lawton, a kiln builder who had built four kilns for the Dixon Company, Charles, Harry and Archibald Maddock of the Thomas Maddock Pottery Company, Joseph Crossley of the Crossley Machine Company and Jonathan Bartley who had been associated with the Dixon Crucible Company for many years. A large building was erected on Oxford Street in the city of Trenton, N. J. It was considered the most up-to-date plant at that time. It was a strictly family organization. Mr. Bartley withdrew in 1911 and during the war the plant was increased to more than double its original capacity. After the war the Maddock branch of the family sold their interest to Lewis H. Lawton who is the son of Lewis Lawton the founder.

Allen Crucible Company

James G. Allen, who had been associated with the Dixon Company since 1884 and who had for several years been Manager of their San Francisco office, withdrew from that company in 1910 to build up a business of his own. He rented or built a small crucible plant in Oakland, Cal., and made crucibles of the smaller size for the United States Mint. Mr. Allen's health became impaired and the plant was closed within a couple or three years.

Lava Crucible Company of Pittsburgh

The origin of this company dates back to 1915 but little progress was made until some four year later. The moving spirit in its inception was J. H. De Bats, an inventor of considerable merit, who had new ideas regarding the manufacture of graphite crucibles, many of which were based on using domestic graphite exclusively. In 1919 the company was incorporated by William Metcalf Jr., Paul L. Berkey, M. W. Ray and E. J. Thompson. Mr. Metcalf came from a steel manufacturing family and this fact is a reasonable explanation for his interest in crucibles. Mr. Metcalf was Lava's first President and he held that office until 1922 when his mantle fell on the shoulders of Paul L. Berkey who had been associated with Mr. De Bats in his early experimental work. In 1920 Mr. Furman South Jr. became associated with the company. The manufacturing was done at Zelienople, Pa., but their main office was in Pittsburgh. In addition to manufacturing graphite crucibles and similar products they were pioneers in the successful development of the so-called "Super-Refractories" and the special high temperature cement, which lines have proved so valuable to the industrial and technical world. In 1928 Mr. Berkey retired and Mr. South was made President. Mr. Berkey's place in the laboratory was filled by Mr. H. E. White. Much research work has been done in Lava's laboratory and that work has placed that company in the front row in the crucible industry. The officers at the present time are Furman South, Jr., President; H. E. White, Vice President; C. H. Curry, Vice President; A. D. Mitchell, Treasurer and D. E. MacLean, Secretary.

The Vesuvius Crucible Company

The Vesuvius Company, located at Swissvale, Penn., was organized and incorporated in 1916. This is one of the youngest of the crucible companies, but it was not really a newcomer to the industry because the President, F. L. Arensberg had been associated with the old concern of McCullough-Dalzell for eight years, and A. J. Jackman who is Secretary and Works Manager brought seventeen years experience from the Morgan Crucible Company of London, England. It was quite natural, therefore, that this new plant would stand in the first rank at its start. It has always been very progressive. When the United States Bureau of Mines began its investigation into the use of domestic graphite and clay as a national emergency measure during the World War the Vesuvius plant was selected for their tests. This intensive study started in 1918 and lasted four years. Prior to 1921 there was much confusion in the industry on account of lack of any standardization of crucible sizes. This limited the crucible user to any one maker whose crucible fitted his equipment, and it was often a serious matter to the crucible maker when his pots were tested with imperfectly fitted tongs. Finally the manufacturers decided to adopt a method of standardization and the Vesuvius Company was selected to do this intricate job. The work was finished in 1922 and the result is that since that date both maker and user have been greatly benefited.

Another thing the Vesuvius Company have been credited with is the introduction of high temperature kiln burning. In many cases when new alloys were being compounded that required new foundry practice the oldtime degree of temperature in burning was found to be inadequate. After many scientific tests Vesuvius finally succeeded in establishing a degree that met the requirement and this has been generally adopted by the other makers. The Vesuvius Company has been a big asset to the crucible makers and a greater one to the user.

Chicago Crucible Company

In 1917 the Northwestern Terra Cotta Company of Chicago was declared a non-essential by the Government. Their plant, located on Clybourn Ave. in the heart of the city attracted the attention of one John Beebe, a wide awake prospector who suggested to the owners a plan to convert a part of their vast plant into a crucible factory. The suggestion was acted upon and the work began in March. On account of the favorable situation in having kilns and a complete power plant to start off with the work was completed within four months and the first kiln containing over 140,000 numbers were opened after a successful burning on Labor Day in that year. The company continued a very prosperous business under the management of William MacFadden (who by the way began his business career in the office of the Dixon Company) until 1930, when the Terra Cotta company needed the room that was temporarily loaned during the war, and then the Crucible Company had a "condition confronting them." To keep the business meant the building of another building without any available ground to build on. The best thought was a merger with some other reliable concern and steps were taken in that direction with the successful Naugatuck plant at Shelton, Conn. A merger was finally brought about and the machinery in the Chicago plant was moved to Shelton where the two firms combined under the name of Chicago-Naugatuck Crucible Company. This combination continued until 1935 when Naugatuck bought Chicago's interest, and this wiped another reputable name from the crucible slate.

Naugatuck Crucible Company

In 1917 the Seymour Manufacturing Company, who were large users of crucibles at that time, felt the necessity of having a more reliable source of supply. A company was organized with a few minority stockholders and Arthur J. Willard was engaged to build a plant on North Canal Street in Shelton, Conn. The long experience Mr. Willard had had in the crucible business expedited the work so that the plant began operation in the Fall of 1917. It made a successful start and stood in the front row with the old timers. D. N. Clark, one of Shelton's reliable business men and one of the original stockholders was made President and General Manager, while Mr. Willard had charge of the manufacturing end. In 1930 the plant merged with the Chicago Crucible Company and the name was changed to Chicago-Naugatuck Crucible Company. This merger lasted until 1935 when Chicago sold their interest to Naugatuck, and the name was again changed to American Crucible Company with the following officers: D. N. Clark, President; F. S. Jerome, Treasurer; H. A. Leigh, Secretary. Mr. Willard retired in 1925 and stands second in age as one of the "Old Guard."

The Pettinos Brothers Plant

This crucible plant might be called a "war baby" because it was built for patriotic reasons. It was in the early part of 1917 when the supply for crucibles did not meet the demand that some munition maker urged the Pettinos Brothers, who were at that time one of the largest importers of graphite in the United States to build a plant to supply the over-demand. A lease was secured on the old Jeffords Pottery at Tilton & Lehigh Avenues in Philadelphia where crucible machinery was installed and operations continued until the close of the war when the plant closed.

Atlantic Terra Cotta Company's Plant

It was probably for patriotic reasons that the Atlantic Terra Cotta Company in 1917 began making crucibles in their plant at South Amboy, N. J. Like Pettinos Brothers, their plant was closed soon after the war was over.

Electro Refractories and Alloys Corporation

This company was incorporated in the fall of 1919 and began operations in November of that year under a patent granted to John Ohman in the use of silicon carbide and graphite with a carbonizing binder, thus eliminating the necessity of using clay as a bond. It is said that this method prolongs the life of the crucible. The company is very progressive in the refractory line. Fused aluminum oxide, electrically fused magnesia and mullite, made into brick and cement are some features of their work. In 1931 the Electro Alloys Corporation was formed for the manufacture of special alloys, and in 1932 this company was merged with the Electro Refractories Corporation and the name changed to its present name The Electro Refractories and Alloys Corporation. The plant is located on Willett Road & B. & O. R. R. in Lackawanna, New York, with an office in Buffalo, N. Y. The officers are L. U. Milward, President; G. S. Diamond, Vice President and Works Manager; William Schreglamn, Secretary and Treasurer.

Conclusion

This brings to a close the history of the American graphite crucible, one of the most interesting industries in the annals of America. Much more could be written about each individual plant, but limited space has forced the ommission of many things that would make interesting reading. The industry has stood nobly for over one hundred years. It has helped the nation in its periods of stress. It has suffered terrific reverses, but it is still sturdy and strong.

Below is the Honor Holl of crucible makers, those firms which have come through the deepest and longest depression in American history, and still have their colors flying:

Joseph Dixon Crucible Company, Monmouth Street and R. R. Avenue, Jersey City, N. J.

J. H. Gautier and Company, Greene and Essex Streets, Jersey City, N. J.

Ross-Tacony Crucible Company, Tacony, Pa.

McCullough-Dalzell Crucible Company, 36th Street and A. V. R. R., Pittsburgh, Pa.

Bay State Crucible Company, Taunton, Mass.

Lava Crucible Company, Pittsburgh, Pa.

Vesuvius Crucible Company, Swissvale, Pa.

American Crucible Company, Shelton, Conn.

Electro Refractories and Alloys Corporation, Willett Road, Buffalo, N. Y.

The writer wishes to express his appreciation for the united co-operation he has received from the Crucible Fraternity, to whom this history is dedicated in memory of past associations.

Aluminum After 50 Years

From 283 Pounds a Year to 230,000,000 Pounds a Year. From $545 a Pound to 20c. a Pound. From Pocket Combs to Railroad Trains.

THE most insidious occupational disease of the early nineties was the "aluminum fever." Almost everyone in industry was subjected to it. Today, fifty years after the discovery of the electrolytic process for making aluminum economically, it is pleasant to recollect the uses to which aluminum was put—many of which are still accounting for a goodly share of the annual tonnage.

The nineties was a busy era. Thomas Edison and Nikola Tesla were literally electrifying the world; Luther Burbank was doing the impossible horticulturally; Carl Benz and Gottlieb Daimler were driving motor-propelled vehicles through the streets of Germany, and men like Count Zeppelin and the Wright brothers were perfecting machines which eventually conquered the air.

It was an era of great scientific interest. The world stood at the threshold of a design for living which even now has only opened vistas presenting greater things to come. It was not surprising that this fever of excitement extended to aluminum.

Aluminum was a symbol of the new age. It was representative of a spirit which still is carrying on. It was a tangible something which loosed the shackles of dead weight and sent man soaring away on the wings of his dreams.

Knowledge concerning aluminum was by no means new fifty years ago. The obstacle to the general acceptance of the white metal was price. No captain of industry, no philanthropist, no regal potentate, could afford the metal in any quantity. Napoleon III found this out when he attempted to make extensive use of aluminum.

Sir Humphrey Davy had suspected the existence of the metal as early as 1807; Oersted isolated a few globules of it in 1825; Woehler succeeded in doing the same two years later. The process of extracting the metal from its ore was a chemical one, and most expensive. But aluminum's qualities attracted an ever increasing stream of scientists.

Aluminum's lightness was the cause of sustained interest in the metal. Napoleon III thought it would be ideal for the helmets and breastplates of his soldiers, perhaps later for their mess kits, scabbards, belt buckles, buttons, cartridges and cartridge cases. Aluminum would considerably lighten the burden of the soldier on his long marches. If it could only be made cheaply enough! In 1852, when Napoleon ascended the throne, the metal sold at $545 a pound —far too costly to be used in great amounts. He commissioned Henri Sainte-Claire Deville, an eminent French scientist, to devise a new reducing process.

Deville was successful—up to a point. In three short years the cost of making a pound of aluminum was reduced to $272. This was a great advance, but it was not far enough. It remained for Charles Martin Hall, a young American, and P. L. T. Heroult, a young Frenchman, to find the eventual answer.

CHARLES MARTIN HALL

Both of these scientists worked out the formula independently of each other, and both announced it to the world in the same year—1886. This date is the most important in the history of aluminum, for the new process, called the Hall-Heroult process, so cut the cost of producing the metal that it could soon be made by the ton.

And now came the aluminum fever! There was no limit to the applications for which aluminum was employed. Such novelties as pocket combs, collar buttons, brushes, thimbles, match boxes, horse shoes and cigar cases consumed a respectable portion of the annual output. The future of aluminum in the cooking utensil industry was assured as soon as the first tea kettle was made. Some applications, after the first flush of excitement was over, fell by the wayside, only to be taken up with even greater vigor in the years to come. There was, for instance, the aluminum used on the seat frames of passenger coaches of the New York, New Haven and Hartford Railroad. Today, the Comet, operated by that Road, is an all-aluminum train which cuts the speed between Boston and Providence to 44 minutes.

Aluminum launches, duck boats, cruisers and other vessels plied various waters in the nineties. While this application was not followed for many years, today there are many uses of aluminum in the marine field. **Diana II,** a 55-ft. pleasure cruiser, has com-

pleted her fifth season in salt water, while **Interceptor,** a 65-ft. patrol boat, is beginning her third. Both of these boats are equipped with aluminum hulls.

It is interesting to thumb through the files of old

Fig. 1. Aluminum Paper Cutter—1894

magazines and papers in order to find the uses to which aluminum was put in the early days. The **London Daily News,** in an editorial in 1894, says:

"There are those who think they see in this material (aluminum) a solution of the problem of flying machines, and some of the prophets go so far as to predict an age of aluminum, not very far ahead of the present time."

Cautious, timid paper! No other material has been so successful in the building of airplanes and airships as aluminum.

In 1885, the year before Hall discovered his new process, the total production of aluminum in the United States was 283 pounds. It was not until Thanksgiving, 1888, however, that the company with which Hall associated himself, The Pittsburgh Reduction Company, began the manufacture of aluminum

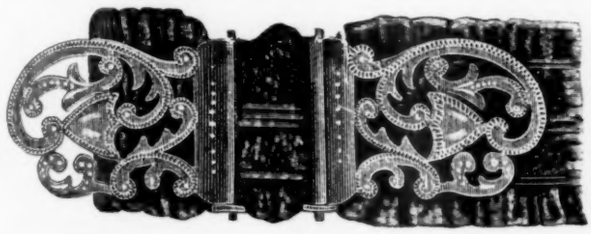


Fig. 2. Aluminum Belt Buckle—1894

in quantity. The following year, 47,000 lb. of the metal was made. In 1890, the annual production jumped to 61,000 lb.; in 1891, to 150,000 lb.; in 1892, to 289,000 lb.; and in 1893, to 333,000 lb.

The founding of the aluminum industry was mainly the work of young men. Hall was young, and so was his associate, A. V. Davis. So was Heroult. At this point, another young man came upon the scene. He was Palmer H. Langdon, and he had a bad case of the aluminum fever. So sure was he of the new metal and its possibilities that he edited a magazine devoted entirely to aluminum and its progress. He was as much an aluminum pioneer as other enthusiasts, and it was with sorrow that his recent death was recorded in a previous issue of **Metal Industry.** Had he lived a few months longer he would have been able to share the celebration of the fiftieth anniversary of Hall's discovery.

Fig. 3. Aluminum Comb—1894

The work he did in editing **The Aluminum World** will never be forgotten, for he maintained among metal users an interest in aluminum at a time when this was most essential. It may be noted here that after **The Aluminum World** was made a part of **Metal Industry** in 1903, no other magazine devoted entirely to aluminum has ever been published in America, although there are several in Europe. These include **Alluminio,** an Italian publication, **Revue De L'Aluminium,** published in Paris, **Aluminium,** a German paper, **Aluminum,** a British magazine, has recently put in its appearance.

Mr. Langdon had an unerring news instinct that would do credit to any editor. No application was too small to go unnoticed, none too large to be adequately treated. Each issue of **The Aluminum World** was crammed with interesting facts. Since its time, the uses of aluminum have increased a thousand-fold.

Fig. 4. Aluminum Garter Buckle—1894

So has its tonnage. The domestic production figures are impressive:

Year	Pounds
1894	550,000
1895	920,000
1896	1,300,000
1897	4,000,000
1898	5,200,000
1899	6,500,000
1900	7,000,000
1901	7,150,000
1902	7,300,000

Too numerous would be the listing of all applications mention in **The Aluminum World,** but a few may be stressed as having the greatest interest in the light of present-day developments.

In the equipment of F. G. Jackson, polar explorer,

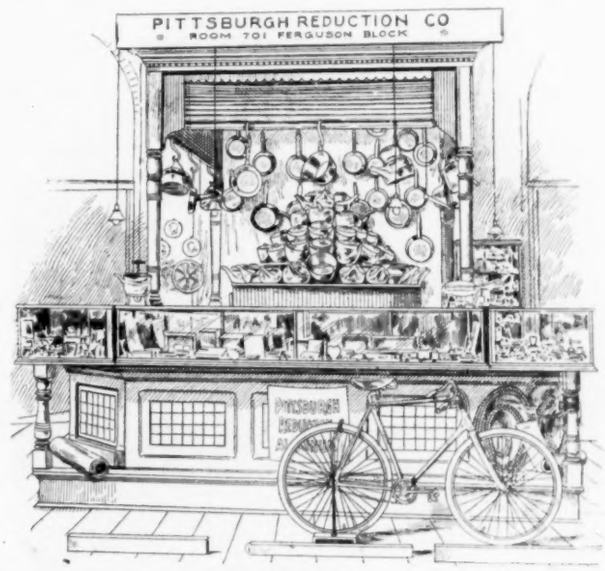


Fig. 5. Pittsburgh Reduction Company Display of Aluminum Products in 1894

was an aluminum boat. He took this with him to Franz-Joseph Land in 1894. Aluminum sled boats were built in that same year for Walter Wellman's

expedition to the Arctic regions. Aluminum boats, canoes and dinghies are again being built today.

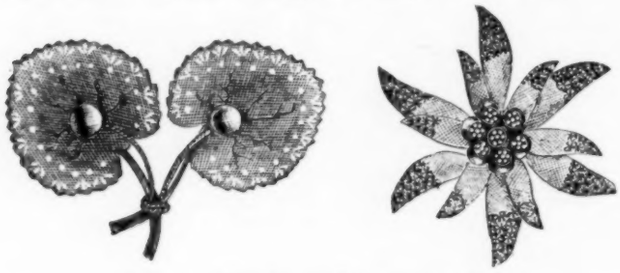


Fig. 6. Aluminum Ornament—1894

There was great talk, in the same year, about the possibility of using some aluminum in United States coinage. While this application for the metal never materialized as far as our country is concerned, (if State tax tokens are excepted) the tupy, the cruziero, the double and the quintuple of Brazil are now made of aluminum. Aluminum has also been used in the coinages of France and Germany.

Almost from the start of Hall's discoveries, the interest of the armies of many nations was concentrated on aluminum, much the same as Napoleon's interest had been a generation before. Brigadier General W. C. Brown tried out aluminum horse shoes when

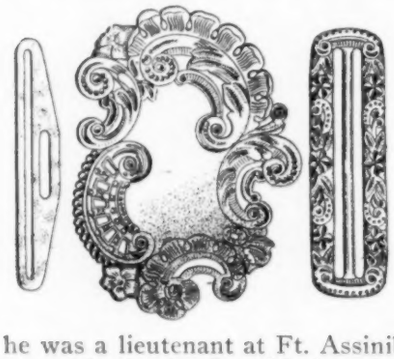


Fig. 7. Aluminum Buckle—1894

he was a lieutenant at Ft. Assiniboine, and aluminum mess kits in the Spanish-American War.

It was a red letter day for the Pittsburgh Reduction Company (now, Aluminum Company of America) when, in September, 1892, 150 tons of aluminum was sold to the German Government for use in cavalry shoes. The Russian army, that same year, began similar experiments. Later on, three regiments of the German army were equipped with aluminum mess kits, buttons, belt buckles and even with aluminum nails for their shoes. Today, aluminum horse shoes are still used by the world's fastest racers.

In 1894, aluminum was first used as a substitute for Bavarian stones in lithography. Today, many thousand pounds of the metal are made for lithographing plates.

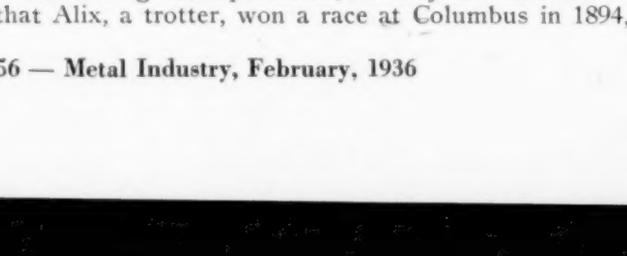


Fig. 8. Aluminum Shirt Waist Set—1894

Concerning transportation, it may be mentioned that Alix, a trotter, won a race at Columbus in 1894, hitched to an aluminum sulky. Two years later, Parisians made a cab of aluminum; and in 1898, the New Jersey Aluminum Company, of Newark, built a delivery wagon with aluminum top, sides, dashrails, handrails and back.

Aluminum sash was used on the cars of the French Northern Railway as early as 1896, and in the same year, the American Motor Company began to make the bases of its motors of aluminum.

In 1898, **The Aluminum World** quoted **The Electrical Engineer** in regard to the aluminum wire used in a transmission line from Snoqualmie Falls to Seattle and Tacoma, Washington. Almost 60 miles of cable carried electrical power to the two Washington cities. This was only the beginning of a large development. Up to the present time, more than 400,000 miles of aluminum cable, steel reinforced, has

Fig. 9. Aluminum Violin—1896

been put into service in the United States and Canada.

Here is an application of aluminum which will bring a smile. In the Fisheries Building of the Columbian Exposition (1893) was exhibited a prize pickerel. This monster was five years old at the time and weighed fourteen pounds. At the close of the Exposition, this particular fish was placed in one of the lakes near Delavan, Wisconsin. Attached to its tail was an aluminum tag which gave its history. Tim Smiley, of Delavan, hooked this fish through the ice on January 29, 1899. The fish was then eleven years old and weighed twenty-two pounds.

They did a lot with aluminum in the sporting goods field. Lures were made of it, and reels, to say nothing of the aluminum shin and shoulder guards worn by the football teams of Harvard, Yale and Princeton

Fig. 10. Aluminum Mandolin—1896

in 1900. Snakeproof leggings were made the year before, aluminum sheet being placed between the canvas casing. Golf clubs were made of aluminum, as they are now.

Pocket combs were perhaps the only novelty which consumed the most tonnage in those early days. They were made of aluminum almost since the first ton of the metal was put on the market at the new low price. By 1902, 25,000 combs were being made daily in the United States alone. But other aluminum novelties were also in great demand. The variety of these may perhaps best be noted from an advertisement which appeared in the October, 1898, issue of **The Aluminum World.** The advertisement was inserted by the Manitowac Aluminum Novelty Company, now the Aluminum Goods Manufacturing Company. Here are listed

combs, napkin rings, shaving mugs, druggists' and grocers' scoops, key chains, paper knives, soap boxes, tablet covers, tobacco boxes, match safes, stamp

Fig. 11. Aluminum Novelties—1935. Various items which have been finished by the Alumilite process. This process consists of surfacing the metal with a fine but very durable coating of aluminum oxide. This coating can be colored with any tint of the rainbow

boxes, ash trays, pin trays, card trays, jewel trays, spectacle cases, spoons and forks, tooth pick holders, tea strainers, funnels, photograph frames, whisk broom holders, lemon squeezers, lemonade shakers, book marks, hair pins, name plates, crumb trays and cigarette cases.

Not to be forgotten in this category of early uses of aluminum is that concomitant of every type of trip, from a picnic under the alders to a journey across the continent—the old collapsible drinking cup. At the turn of the Century, every child had to have such a drinking cup in his pocket when taking a railroad trip, and no matter how brief the ride, the day was a total loss unless it was possible to venture down the aisle to the drinking fountain, fill the cup, and bring it back to the seat to the train's precarious swaying!

Aluminum is used today in automobiles, tanks and buses. It may be of interest to antiquarians and historians of the metal industry to know that in August, 1902, J. M. Quinby & Company, of Newark, completed a 16-hp. automobile, the body of which was made of aluminum. A detailed description is given in the September, 1902, issue of **The Aluminum World.**

"The body of the auto," it said, (and here, by the way, is the first mention of that new word, **auto,** as earlier copies called the new vehicle **horseless carriage, motor carriage** and **automobile**) "is made entirely of sheet aluminum, likewise the mud guards, also some of the motor parts, which are of course out of sight. The body and mud guards are finished in a red enamel. The vehicle is what is known as the tonneau type, and is fitted with a 16-hp. Panhard motor. The body was built by J. M. Quinby & Company, Newark, New Jersey, for Smith & Mabley, of New York, and is modeled after the vehicles built by the French firm, Charron, Girardot & Voigt. In speaking of the advantages of aluminum for structural work in automobiles Mr. James Anderson, of Smith & Mabley, says that the automobilists desire the body of a vehicle to be of material which in the case of accident will not splinter, this being a fault of wood. Aluminum is strong enough for the purpose and if in an accident will bend and can be readily reshaped. The lightness of aluminum is also an advantage, as it does not add to the weight of a vehicle already weighted down with a motor and fuel supply. The automobile shown in the cut is owned by Thomas A. Griffin, president of the Griffin Car Wheel Company. The vehicle has been in service for two months and is entirely satisfactory."

Somewhere on the "entirely satisfactory" vehicle the letters TAG were prominently displayed, the initials of Mr. Griffin, for a year earlier the legislature of the State of New York made it obligatory for owners of automobiles to register with the secretary of the State and to attach to their machines, in a conspicuous place, their initials. A number of firms made these tags of leather, the initials being of aluminum.

After **The Aluminum World** ceased publication as such, Palmer Langdon did not forget his first love. **The Aluminum World** was merged with other magazines to form **The Metal Industry,** and in **The Metal Industry** have appeared copious notices concerning the strides which aluminum made.

The production curve was decidedly upward. In 1907, more than 17,000,000 lb. was made; two years later, this figure had doubled. It doubled again by 1912.

The price was coming down. In 1908, aluminum cost 35 cents a pound and was being used in automobiles, cooking utensils, and sheet-metal articles. In 1910 came the announcement of duralumin, invented by Alfred Wilm, of Germany. In 1911 the new uses mentioned were aluminum bronze powder and aluminum foil. The applications of both commodities were at first restricted. Today, the uses have widened greatly.

In 1912, extruded forms and tubing were produced in quantity for the first time, and a seven-strand cable, six strands of which were aluminum, the seventh steel, was adopted by a number of power companies. A British report in 1914 mentioned the fact that

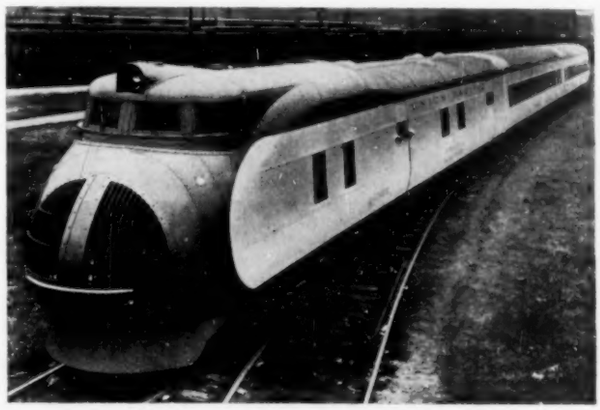


Fig. 12. Aluminum Train—1935. The first of the four streamlined trains of the Union Pacific System. This train is built of aluminum alloy, sheet, plate, extruded shapes and structural members

aluminum was finding application in breweries, and that fermenting tuns and vessels for the treatment of chilled and filtered beer were being made. Aluminum containers were also being used in the varnish and

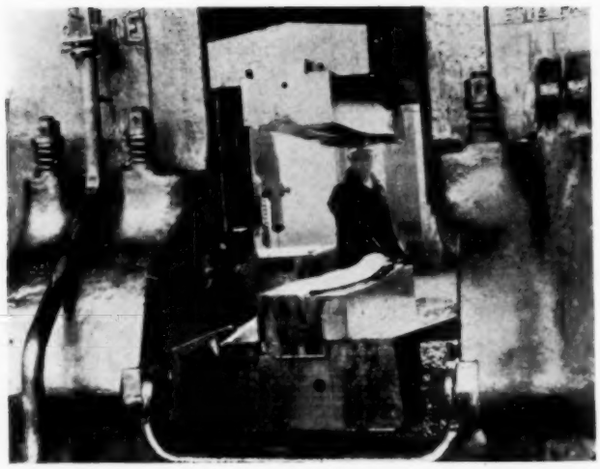


Fig. 13. A view in the Forge Shop of the Cleveland Works of the Aluminum Company of America. An airplane propeller blade is being hammered into shape

food industries, in the refining of sugar, in jam making and in dyeing.

There was a temporary slump in the consumption of aluminum in 1913 and 1914, and it was feared that the War would cause another. However, the domestic production in those years was more than nine times that of 1902, and in 1915 it soared to 99,000,000 pounds.

The banner years of the young industry were the War years:

Year	Pounds
1916	139,000,000
1917	200,000,000
1918	225,000,000
1919	198,000,000
1920	138,000,000
1921	55,000,000

Even after the War, considerable aluminum was used, principally because the stocks on non-military products were low. But in the depression of 1921, the market was glutted, and there was little demand for further aluminum production. By 1922, business had picked up, and two years later the aluminum industry produced 150,000,000 pounds.

New alloys were announced in **The Metal Industry.** Screw-machine-products, hitherto confined to other metals, were being made of aluminum. A year later, the development of forged aluminum connecting rods opened up a new field for the metal. From these it was but a short step to the forging of airplane propellers. Aluminum file guides, motor boat hulls, and food wrappers put in their appearance, while the sale of cable increased.

Additional strong alloys were developed in succeeding years, while aluminum die and permanent mold castings were developed to a point where they attracted attention. But read the cautious note which was sounded in the 1925 report and compare it with the outstanding success aluminum has had in the transportation field since that time:

"One of the striking developments in aluminum is the rather bold effort of its proponents to employ it in places where heretofore steel and wood have seemed to be the only suitable materials. The most striking case is in the use of aluminum for steam railway cars. One of the largest railroads of the country has built a number of aluminum cars, thereby reducing the weight of the car by about three tons. Also, in automobile buses, which are becoming such a standard form of transportation, aluminum is being employed more widely than ever for the purpose of reducing weight. If it can be shown that aluminum withstands the severe strain which is placed upon any material employed in the transportation of people, and at the same time guarantees an economy in weight carried, its future in this field would seem to be assured."

The commodities march on. In 1926, foil could be rolled to a thickness of .00025 in.; it takes 4,000 sheets

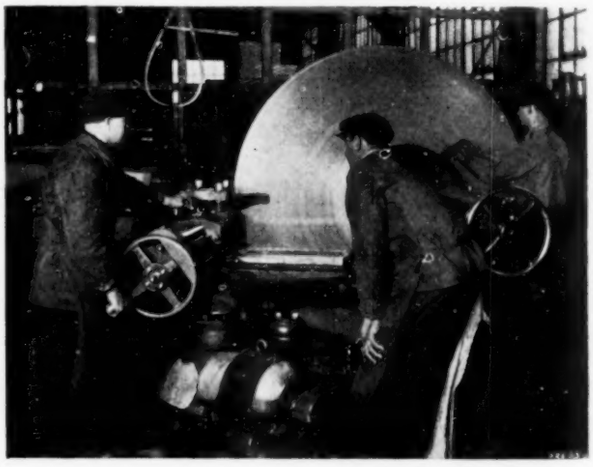


Fig. 14. Spinning the top of a large aluminum kettle

of foil of this gage to make an inch. The rayon industry used aluminum bobbins, stretcher bars and spinning buckets, while the rubber industry learned to

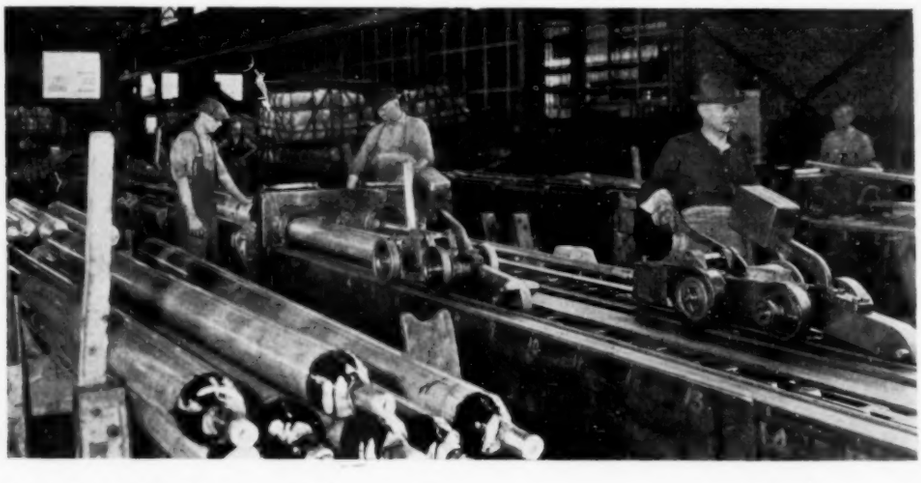


Fig. 15. Drawing Aluminum Tubing

prefer aluminum for inner tube and balloon tire mandrels. Aluminum chairs were on the market, and radio sets were equipped with aluminum shields. Washing machine agitators and wringers were made of aluminum, as were collapsible tubes for the packaging of shaving creams and tooth paste. Aluminum shingles covered the roofs of houses and buildings alike.

In the same year, the Cleveland Railway Company put an all-aluminum car on its tracks. **Cigarette IV**, an aluminum-hulled racer, won the President's Cup, and the steeple of the German Evangelical Protestant Church in Pittsburgh was made of aluminum castings. The possibility of aluminum structural members was first discussed by Dr. Zay Jeffries before the New York Electrical Society in 1927. An aluminum propeller pulled the "Spirit of St. Louis" across the Atlantic to win undying fame for Lindbergh.

Manganese steel helmets were all very well in the War, but in peace time they are heavy and cumbersome. Prince Henry, a younger brother of King George VIII, found this out when reviewing troops, and so in 1928, he ordered an aluminum helmet made for his own personal use. Other officers of the British Army copied him, and as a result, parade helmets were thereafter made of the lighter metal.

The Aluminum Research Laboratories of New Kensington, Pennsylvania, was mentioned in 1930 issues of **The Metal Industry,** and in 1931 there appeared a notice regarding the mast of the **Enterprise,** which kept the America's Cup on American shores. In the following year, comment was made about the 3,100 chairs for the Waldorf-Astoria, largest institutional order for aluminum furniture ever received. Hopper cars and electric street cars were discussed, as well as traveling cranes of aluminum and aluminum dairy equipment.

Despite the depression, the domestic tonnage was considerable.

Year	Pounds
1927	160,000,000
1928	210,000,000
1929	225,000,000
1930	229,000,000
1931	177,500,000
1932	104,000,000

Only in 1933 and 1934 did the annual tonnage take a serious drop. Both years reported less than 100,000,000 lb. produced. However, an increased use of aluminum in building construction, transportation, and other heavy duty fields helped to minimize the effect of this decline; while new developments, such as the Alumilite process, by which a very hard coating is imposed on the surface of the metal, increased the versatility of aluminum.

Streamlined trains, Pullman cars, brewery equipment, beds, dragline booms, shovel dippers and aluminum in sewage disposal plants increased the new uses.

The aluminum fever burned with a steady flush. It hasn't abated yet. Compare the joyous carolling of the Aluminum Company of America in 1930 when the headline of an advertisement read:

"One of these days you will ride on an aluminum train!" with the enthusiastic paragraph written in 1900 by Joseph Allison Steinmetz:

"The great new white metal aluminum! Houses, bridges and locomotives to be built of it. Iron and steel, metals of the past, with the great 'Aluminum Age' drawing upon us."

It took a great deal of imagination in 1900 to vision a house built of aluminum. But today, only 36 years later, the aluminum applications to houses, office buildings and similar structures are innumerable. The aluminum bridge has become a reality, and the recent trend toward streamline trains bids fair to show what railroad carriers will look like in their aluminum suits. The last fifty years have shown a development in aluminum greater than any other metal can boast.

What will the next fifty years bring?

Cracking Brass Shells

Q.—WE have run into some trouble with a spun brass shell. After being spun and put through the usual cleaning operations the shells crack and begin to disintegrate.

The cleaning operations are as follows: potash, hot water, cold water, pickle, acid dip, cold water, hot water, and put on screens in hot room to dry

Two samples of these shells are going to you under separate mail.

After being spun and before the cleaning operations the shells seem to be perfectly O. K.

A.—You have probably run into a batch of stock that is too low in copper to withstand the severe cold working. Try samples from some other stock for confirmation. Sheet brass is not always strictly uniform in composition and it is easy to get below the standard, especially where a lower cost is stressed. An analysis of this stock would be interesting, showing not only the percentages of copper and zinc, but also the impurities in iron and lead.

A second cause, either alone or with the one above mentioned, may be the lack of annealing or improper annealing. The stock should be truly soft to begin with, and if an extra anneal is not given during the spinning, one is beneficial before using the cleaning and pickle. Severe stresses are set up in spinning this article, and both the potash and the acid tend to attack the metal, resulting in premature age cracks or splits.

The grain of the metal should be fairly fine and its texture soft. The spun sample showed a coarse grain and a brittle texture. To anneal requires a slow heating, anywhere from one hour to overnight to about 1100 deg. F. for 70-30 brass to change its coarse grain to a fine one. Too high heating causes larger grain. Brass is subject to season cracking after cold working, such as spinning. After cleaning the surface by the corrosive action of acid and alkali, slow annealing to within 475-650 deg. F. is satisfactory with some conditions and compositions of brass.

A third cause of the defective work may be from the tooling in spinning. The operator may be too fast and unduly overheat the metal; also the tool may not be shaped and surfaced properly, thus abusing the metal. Let us know how you succeed with the remedies suggested. Send samples of the brass before spinning, and sample after spinning and before cleaning.—**W. B. Francis.**

Synthetic Enamels

By RAY C. MARTIN

What They Are; Their Uses and Advantages.

THERE is probably no one development or discovery that has affected the paint, varnish and lacquer industry as that of synthetic resins.

It is interesting to note that attempts in the earlier part of the present century to manufacture a synthetic shellac laid the foundation of the present deluge of synthetic resinous compounds.

Earlier variations of the present day synthetic resins first found usage in connection with the electrical field. The superiority of the resultant coatings thus formed over any previous type of coating indicated their investigation and ultimate adaption in the paint field. The development or discovery of these synthetic compounds is as important to that industry as the development of low viscosity nitrocellulose and butyl alcohol was to the lacquer industry.

The expression "synthetic" although well known at this time, is oftentimes confusing. For want of a better name, they are called "synthetic resins" and are chemical compounds. In every sense of the word, they are chemicals which are of great complexity and are presented as an attempt "synthetically" to reproduce a product of nature in the form of a comparable to vegetable drying oils combined with fossil gums or resins. These combined drying oils and resins are termed varnishes which permit of the development of coating films of durable nature. "Synthetic finishes" resemble these varnishes but are far superior to them.

The introduction of synthetic resins, from which result a new type of baking enamel, has changed the pace of industry and by virtue of great versatility has injected new life and presented industry with a much broader field. The field of industrial finishes is greatly benefiting by these new resins and enamels and the greatest success has been achieved in this field.

Some of the advantages of synthetic enamels are summed up in the following:

(a) Greater durability
(b) Greater flexibility
(c) Better appearance
(d) Higher lustre
(e) Greater covering capacity
(f) Greater resistance to abuse and to the elements.

In industry today there are many basic types of synthetic resins which may be formulated into enamels. There are however two general types most prominently employed which are: Phenol-Formaldehyde and the Glycerol-Phthallate or Alkyd resins.

The Phenol Formaldehyde type of resins are essentially reaction products of such phenolic compounds as phenols, cresols and xylenols with formaldehyde, paraformaldehyde or acetaldehyde. Such compounded resins are of no use in lacquers since they are infusible and insoluble in solvents of all types. Such resins find great usage in the molding industry and may be procured in various stages of reaction just prior to the infusible state. On heating under pressure they conform to the mold used and thus are fabricated into many useful articles—replacing iron or steel in the manufacture of many products. The Bakelite products of today are of the phenol formaldehyde resinoid type plus fillers and coloring matter to impart tensile strength and color respectively.

It was realized very early that the phenol formaldehyde resins of the former class were very alkali and acid resistant and would be a very decided advantage in lacquers and varnishes provided they could be produced in a form compatible with nitrocellulose and oils.

The need for oil soluble types was met by the early Amberols which were phenol formaldehyde resins modified with rosin, ester gum, etc. The advent of these resins hastened considerably the birth of four-hour enamels. However, these grades were not entirely compatible with nitrocellulose because the phenol formaldehyde part of the resin was not compatible.

Futher research produced the so-called "100% phenol-formaldehyde resins." These resins were reaction products of modified phenols with formaldehyde and/or paraformaldehyde and are not to be confused with phenol formaldehyde resins modified with ester gum, rosin, etc. Several of the "phenols" used in the manufacture of "100% phenol-formaldehyde resins" are diphenyl phenol—paratertiaryamylphenol and paratertiarybutylphenol. The property of compatibility with oils has been achieved by "polarizing" phenol with various chemical groups which serve to decrease the chemical reactivity of the phenol and also draw it into solution with the oil.

The Glycerol-Phthallate or Alkyd Resins are essentially reaction products of glycerine and phthallic anhydride which are modified with drying and/or non-drying oil acids as well as natural resins and phenol formaldehyde and combinations of all.

The alkyd resins occupy a unique place in the coating field due to their versatility. They may be used in lacquers, blended with oils and varnishes and baked or air dried by themselves depending on the manner in which they have been modified.

The oxidizing types may be air dried or baked, being both oxidizable and heat convertable.

The alkyd resins are the most durable resins obtainable for outside exposure and the gloss retention properties are excellent. Resistant to the elements on outside durability tests are phenomenal.

Glycerol phthallate resins modified with rosin, non-

drying oils or small amounts of drying oils are especially recommended for lacquer formulation.

Alkyd resins are thermoplastic and because of this feature they impart toughness which is achieved when they are properly heat-treated (baked).

Baking

The harder oxidizable and semi-oxidizable types of alkyd resins are essentially for baking purposes, requiring temperatures of 275°F to 325°F to acquire conversion to the insoluble state where they are resistant to many solvents including alcohols.

The slightly softer oxidizing resins may be baked at lower temperatures and excessive temperatures should be avoided or wrinkling and darkening may ensue. At temperatures of 225°F to 275°F the baking is due mostly to oxidation.

The soft oxidizable types are essentially air drying resins but may be force dried at temperatures of 180°F to 225°F.

When baking alkyd resins, driers are not ordinarily used, but small percentages of cobalt-zinc napthenate (1-3) are generally recommended where schedules do not permit long baking periods. Pigments (e blacks and reds) have a tendency to lengthen the baking period over that which is normally required.

Air Drying

The hard oxidizable types of alkyd resins are used for fast "set-up" coatings due to their initial hardness and low solvent retention. Their success in application is determined by applying in thin coats, and it may be stated that the oxidation period of this class of coatings is not decidedly shorter than that of the softer types due to the fact that the modifying drying oils in each require a definite interval to oxidize.

The slightly softer oxidizable types enjoy the property of "setting-up" fast and becoming dry in a relatively short period of time.

The soft oxidizable types are similar to oil varnishes as regards drying in that they "set-up" more slowly and dry more slowly to a hard film.

Solvents

The solvents required for alkyd resins vary from Toluol, Xylol, etc. to VMP naphtha and mineral spirits. The harder types require the aromatic solvents and the softer types require the hydrocarbon or petroleum solvents for best results.

The intermediate types, as regards to hardness, usually require mixtures of both aromatic and hydrocarbon solvents in order to assure stability.

It is interesting to note that a few per cent of Butanol (e.g. 5%) will cause a marked decrease in the viscosity when added to a formula employing a hard type alkyd resin. Although not a solvent for alkyd resin, it is believed that butanol assists the dispersion of the resins in solvents by being absorbed in the jel-like structure where it influences its polar properties.

Driers

Driers of the napthenate type have been found to be more desirable in connection with alkyd resins. The kind and amount of driers to use depend somewhat on the formulation and its intended use. Generally speaking, however, a tri-metallic drier consisting of cobalt-manganese and lead is found most efficient for air drying purposes while cobalt-zinc (1:3) works to best advantage in the case of baking enamels.

Compatibility

The softer types of alkyd resins are usually compatible with oils and varnishes; the manufacturers usually indicate those resins embodying the property. It must be realized, however, that blending with oils makes for ease of brushing at the expense of durability.

Compatibility with Zinc Oxide and other basic pigments is usually determined by the acid number of the solid resin. As a general rule, a resin vehicle with an acid number below 15 (based on the solids) can be used with basic pigments without undue bodying. It may be stated that the acid number of alkyd resins has little if any bearing on the durability of these products. When the resinous body just described is manufactured into an enamel by the induction of pigment matter we find we are able to produce protective coatings which may be applied in any of the many ways used and we are able to improve markedly on many of the finishes hitherto used.

Actual investigation has proven these "synthetic finishes" have better coverage, dry more rapidly, retain their gloss longer, have greater resistance to gasoline, alkalies, acids, oil, water and abrasion and they possess greater flexibility to withstand contraction and expansion.

Synthetic enamels are customarily applied by spray gun application. A single coat is sufficient to cover most surfaces, or a mist coat followed by a covercoat may be applied. This is a general practice where black iron is being coated. Following the spray application, the object so coated is set aside in a place free of dirt for 15 minutes or so and then is placed in the oven for baking.

Perhaps one of the greatest achievements made possible by synthetics is the perfection of a white enamel for baking, especially designated for use on exterior metal signs. This product may be baked at such elevated temperatures as 300°F to 450°F for times ranging from 20 minutes to 60 minutes. The enamel after it has received this bake is a very close approach to vitreous enamel. Having the high gloss, adhesive, flexible and resistant qualities so desired. The paint chemist today naturally feels very elated over the remarkable achievement wrought in synthetic resins and enamels.

Slush Molding Metal

Q.—Please find enclosed two samples of metal. The solid piece is from our stock which is used for casting small ornaments in slush molds.

The broken parts of metal appear to be antimony and I would like to know what to add so it will be like the metal in the solid piece. I tried to melt some of this metal but it seems to require more heat than my regular metal and it becomes a spongy mass, which will not pour.

A.—On inspection of the two samples of metal submitted we find the solid piece that you call your regular metal is a lead base alloy—approximately 95 lead and 5 antimony, and the broken parts of metal are a zinc base alloy, approximately 95% zinc.

There is nothing you can do to or add to the zinc base alloy to make the lead base alloy. You should be able to use the zinc base alloy for slush molding for lamp stands, etc. We suggest that you add, if you can use zinc base alloys in your work, 25% new zinc. We suggest High Grade Zinc.

—W. J. Reardon

Magnesium Base Alloys

By SAM TOUR
Consulting Metallurgist,
Lucius Pitkin, Inc., New York.

File This Page With Your Brass Founders' Manual.

1. Specifications.*

CHEMICAL

	Alloy C-11[1]	Alloy C-12[2]	Alloy C-13[3]	Alloy C-14
Aluminum, per cent	7.0-9.0	9.0-11.0	11.2-12.8	5.3-6.7
Manganese, per cent (min.)	0.15	0.10	0.10	0.15
Zinc, per cent	0.3 max.	0.3 max.	0.3 max.	2.5-3.5
Copper, per cent	0.10 max.	0.10 max.	0.10 max.	0.10 max.
Silicon, per cent (max.)	0.5	0.5	0.5	0.5
Other impurities*, per cent	0.3 max.	0.3 max.	0.3 max.	0.3 max.
Magnesium, per cent	remainder	remainder	remainder	remainder

PHYSICAL

Alloy	Condition	Tensile strength min. lb. per sq. in.	Elongation in 2 in. min. per cent
C-11[1]	Cast	23,000	3
	H.T. No. 1[6]	29,000	6
C-12[2]	H.T. No. 1[6]	29,000	5
	H.T. No. 2[7]	29,000	2
	H.T. No. 3[8]	29,000	not required
C-13[3]	H.T. No. 3[8]	27,000	not required
C-14[4]	Cast[9]	24,000	4

* Nickel, maximum per cent 0.05.
[1] C-11—Conforms to A.S.T.M. Spec. No. B80-34T Alloy 1.
[2] C-12—Conforms to A.S.T.M. Spec. No. B80-34T Alloy 2.
[3] C-13—Conforms to A.S.T.M. Spec. No. B80-34T Alloy 3.
[4] C-14—Conforms to A.S.T.M. Spec. No. B80-34T Alloy 4.
[6] H.T. No. 1—solution heat treatment.
[7] H.T. No. 2—solution heat treatment + partial aging.
[8] H.T. No. 3—solution heat treatment + complete aging.
[9] Heat treatment of Alloy C-14 is such a recent development that it has not been covered by A.S.T.M. Specifications.

2. Raw Materials.

The raw materials for these alloys consist of magnesium, aluminum, manganese and zinc. The alloying elements may be added as the metal or in the form of hardeners.

3. Sands.

The sands for these alloys should be quite coarse and permeable, to allow the steam and gases to escape easily into the body of the mold. When green sand molds are used, it is the practice to use an addition agent to prevent surface burning. For this purpose various chemicals may be used such as boric acid, sulphur, etc. Sand is wet with a mixture of glycol 25% and water 75%.

Cores are made from a mixture of silica sand and molding sand to which a suitable binding material has been added.

4. Molding.

A few special precautions are necessary in making molds for these alloys, due to their extreme lightness and ease of oxidation.

The sand should be lightly rammed and well vented. A good pressure head should be provided to insure complete expulsion of air and gases. Several small gates are usually preferable to a single large gate as an aid in reducing burning. Mechanically entrapped air is kept from entering the mold by the use of wedge gates backed by a pocket trap. The insertion of a screen skimmer in the sprue or runner, helps to maintain a full sprue and thus reduces the tendency to mechanically entrap air. Chills are used on heavy sections to prevent shrinking and at sudden changes in cross sections of the casting to prevent cracking.

5. Melting and Pouring.

The preparation of these alloys is readily accomplished by direct additions of the individual metals or hardeners. The added ingredients are best alloyed with a small amount of magnesium in the ladle and this magnesium rich alloy then mixed with the mass of metal in the pot.

These alloys are best melted with a flux. The flux acts to prevent oxidation, purify the metal by removing the non-metallic impurities and to permit continuous melting and pouring. The flux must have a carefully controlled density and surface tension so that it will float the molten metal and at the same time completely envelop it with a thin protective film. A suitable flux is one containing about 60% anhydrous magnesium chloride and 40% sodium chloride.

In melting these alloys the flux is first placed in the bottom of the pot and the metal then added. The flux melts first and serves as a bath into which the metal sinks and melts.

The metal is poured from ladles having a bottom draw-off.

The pouring temperature depends upon the alloy composition and on the nature of the casting. It will vary from 1150° to 1300° F.

6. Cleaning.

Gates and risers are removed by band saws or sprue cutters. Final finishing is accomplished with grinding wheels and files. Sand-blasting is also used both as a final finishing and as a preparatory finish for further work. Surface protection is obtained by a final chromate dip or treatment.

7. Reclamation.

All forms of foundry and machine shop scrap, including sprues, shavings and sawdust may be remelted. Care should be taken to keep the scrap of each alloy separate. Shavings and grindings should be freed of iron by passing them over a magnetic separator. The scrap is purified by the mechanical washing of the flux, impurities uniting with the flux and sinking to the bottom of the pot to form a sludge.

*Full acknowledgement is given to the American Foundrymen's Association from whose Cast Metals Handbook these Specifications are taken.

Editorial Comment

Business Continues Improvement

BUSINESS activity has continued to increase according to the National Industrial Conference Board. December was the sixth consecutive month on the upward trend. Employment decreased by 218,000 during that month, bringing it down to 8,979,000, according to the same authority. This is 2.4 per cent below November, 1935 and 9.3 per cent below December, 1934. At the same time, world industrial production also continues to rise. The gold value of world trade increased during October to the highest point since December, 1932.

According to the Cleveland Trust Company, business is getting off to a good start in 1936. Replacement of worn out goods (both durable and consumer), and Government expenditures under the head of work relief seem to be the effective forces at this time in pushing business ahead.

The clouds on the horizon are the strained relations between business and the Administration, and the fact that this is a presidential election year, highly political in character.

Accrediting Plating Shops

A CHARACTERISTICally progressive plan was presented by Maxwell M. Wise, president of the Master Electro-Platers' Institute of the United States, at a recent meeting of the Master Electro-Platers' Association of the Mid-West. This plan, in a nutshell, consists of accrediting or certifying such job plating shops which are striving with all the means at their disposal to produce jobs of known quality and finish, and as uniformly as possible.

The basis upon which shops would be judged were given tentatively as follows:

1. Good credit rating.
2. Promoting quality and specification plating.
3. Active members of Institute and local groups if any, including the American Electro-Platers' Society.

Modern shop practice would be required. Such practice includes fair treatment of personnel, with adequate supervision; cleanliness of the plant; sufficient light and ventilation; good operating condition of electrical equipment, polishing and buffing lathes, plating tanks and solutions, rinsing, cleaning and etching tanks; good plant layout; and last but far from least, technical control consisting of regular and sufficiently frequent determination of cyanide content, pH and metal content, and frequent tests of work for checking the thickness and quality of metal deposited.

The above points were suggested by Mr. Wise as tentative, naturally enough. They are only a start. Only time and experience will polish up any list of requirements to the point where they are sufficient to satisfy consumers and still practical in application. An earnest request is made for suggestions, additions, revisions or criticisms, to be forwarded to the Committee on Quality, 7320 Hamilton Avenue, Detroit, Mich.

The Silver Dilemma

THE recently published Annual Review of the Silver Market by Handy and Harman, the leading silver bullion dealers, gave as their opinion of the silver situation, a statement which might well be accepted for the silver manufacturing industry as a whole.

> "In our opinion no permanent good can come from increasing and supporting the price level of silver at a point above that warranted by the economic conditions of the world market. And when the intermediate effect is to accomplish results diametrically opposed to the intended objectives, it would seem as if the fallacy of the program had been proven . . . . European nations have shown no inclination since the London Economic Conference to employ silver more widely in their monetary systems, and their conversion seems unlikely under present circumstances. If, however, any progress is to be made in this direction, it seems to us that the United States must concentrate its efforts upon monetary stabilization, and relegate the matter of silver to a position of secondary importance. Furthermore, in such negotiations, the term 'stabilization' as applied to silver should not be interpreted to mean only an enhancement of price . . . . In spite of the fact that we favor the principle of a market governed by the law of supply and demand, we appreciate that it would prove disastrous, under present conditions, to have the United States withdraw its support entirely. A revision or repeal of the Silver Purchase Act may be necessary."

We have nothing to add to this opinion for the simple reason that it tells the whole story.

Divulging Trade Secrets

AN INTERESTING decision was rendered recently by Judge Frank T. Sutton, Jr., at Richmond, Va., concerning the divulging or making use of information about secret processes which an employee might have gained in working for an employer. The complaint stated that a certain company had bought the rights as to certain processes for the extraction of antimony and arsenic from tin bearing metals, among others. The individual in charge of the operation of the company's plant was discovered writing to other companies, applying for a position and offering to divulge these operations. The court issued an injunction preventing the employee from divulging such information on the ground that such action would seriously damage the business of his company and the plans of the owners of the process who are negotiating with other firms with a view to leasing their rights.

All of which means that the employee who, by virtue of his position becomes acquainted with processes that have been developed at the expense of his company, has no right to divulge them to others.

Correspondence and Discussion

Lilacs and Buttercups to the Living

The reasons I have not forwarded to you my next letter to my good friend Billy Reardon is that I recently got through with a seven week's struggle with pneumonia. For a time it looked as if I had poured my last heat, but here I am writing to you. This, by the way, is the first attempt since I left the hospital and of course I am still a little weak. During this sickness I had a 103° to 104° fever and the sisters, God bless them, (and this from a free thinker) told me that I made Brass, Bronze, and Aluminum castings that had tensile strength, Brinell hardness and wearing qualities that even Charlie Bohn would be proud of. Billy Reardon, of course, would put on the sweet trick smile of his and wonder what I had to drink. I also caught fish, they tell me, that weighed tons and were a good many feet long. However, I know nothing about this. I am only repeating what the nurses and the good sisters told me afterwards. The doctor was more to the point. His remark was, "Otto, if it were not for the fact that you have a good 'ticker' you would have never made the grade." I have been wondering since if it would not have been a good thing had I passed out while I had the tensile strength of airplane metal up to a million pounds. Wiley Post said, "When I pass out, I hope it will be in an airplane"; why not a brass foundryman when he gets metals up to where I had them in this fever?

You know I have seen so many of us go like Charlie Vickers for instance, one of the best, and you know he came very near being buried in Potter's field. I don't believe that there is such a thing as thanks or honor for such men as he in our line of business. Do you?

What I really mean to write to you is this—I believe some of us should be presented with a few lilacs or buttercups while we are alive instead of the American beauty roses and white lilies when we are dead, and that is why I am handing you this. You have been a good friend and you have worked hard to keep your publication on its feet during this depression. I know it was not an easy job. Personally I believe your magazine deserves more support from the brass foundry and plating industry. I believe every brass foundry and plating works should be a subscriber to your journal. Not only that, but they should subscribe for everyone of their employees and it would be money well spent. It would make for better mechanics and better workmen. As it is the manager or perhaps the superintendent gets it, reads it over or does not, as the case may be. He may pick out an article that is worth many dollars to his firm, and gets credit for it all. If his men could read the same article they could work with him and still make more money for the firm that employs them and he would get still more credit from the higher ups. I remember while in business how happy I felt when some customer called me up and said, "Otto, the castings you sent over to us are the best castings we ever handled." **What a thrill that was for me!** On the other hand when a foreman or superintendent didn't like me for some reason or other he would save up a few castings out of perhaps tons delivered, take them down to the manager and say, "Them are the kind of castings we are getting from Gerline's." The manager would then call up the Gerline Brass and perhaps say, "I wish you would come over and look at some of the rotten work you are sending us. If you can't furnish us with better castings we will be compelled to go elsewhere for our work." Not so nice for the old man!

And that is why I am writing this letter to you. In case I have another attack of pneumonia in which I may not come out so lucky I want to tell you that since the beginning of the Aluminum World, Copper & Brass and later the **Metal Industry,** I got a wonderful lot of useful information out of them all, worth many times the price of subscriptions, and I still believe that every brass molder, melter and plater as well as brass worker should have your journal. The cost is so small and the value so great! You can publish this if you wish or you can keep it as a personal letter to you and your esteemed journal.

If you believe it would interest your readers to furnish my tale of woe part of which you published I will try to close with—how I started in business, how I came out and why I quit.

With kindest regards I wish to always remain your friend.

OTTO GERLINE.

Kalamazoo, Mich.

Another installment of Mr. Gerline's reminiscences, "A Brass Foundryman's Progress" will appear in an early issue. —Ed.

Government Publications

Packaging of Automotive (Bus) Engine Parts. Simplified Practice Recommendation R161-35. National Bureau of Standards, Washington. For sale by the Superintendent of Documents, Washington, D. C., 5 cents.

Lead Industry in 1935. Advance Summary. U. S. Bureau of Mines, Washington, D. C.

Lead and Zinc Pigments and Zinc Salts, by Elmer W. Pehrson and H. M. Meyer. U. S. Bureau of Mines, Washington, D. C.

Copper Industry in 1935—Advance Summary. U. S. Bureau of Mines, Washington, D. C.

Zinc, by Elmer W. Pehrson. U. S. Bureau of Mines, Washington, D. C. Obtainable from the Superintendent of Documents, Washington, D. C., for 5 cents.

Packaging of Automotive (Bus) Engine Parts. Simplified Practice Recommendation R161-35. National Bureau of Standards, Washington, D. C. Obtainable from the Superintendent of Documents, Washington, D. C., for 5 cents.

Lead and Zinc Pigments and Zinc Salts Industry in 1935—Advance Summary. United States Bureau of Mines, Washington, D. C.

Proposed Federal Specification for Aluminum Alloy Castings. Federal Specifications Division, Rm. 751, Federal Warehouse, 9th and D. Streets, S. W., Washington, D. C. All comments or criticisms must be received not later than February 25, 1936.

Proposed Federal Specification. Aluminum Alloy (Aluminum-Magnesium-Silicon-Chromium) Bars, Rods, Shapes and Wire. Federal Specifications Division, Rm. 751, Federal Warehouse, 9th and D. Streets, S. W., Washington, D. C. All comments or criticisms must be received not later than February 25, 1936.

Technical Publications

Improvement in the Quality of Tinplate by Superimposed Electrodeposition of Tin, by A. W. Hothersall and W. N. Bradshaw. Series A No. 22. International Tin and Development Council, 149 Broadway, New York.

Dust Collection and Control. A compilation of the papers and discussion presented by the American Foundrymen's Association at the annual convention in Toronto, Canada, August 21-23. Price 50 cents. Obtainable from the American Foundrymen's Association, 222 W. Adams Street, Chicago, Ill.

Electrodeposition of Bronze Using Bi-Metallic Anodes, by C. Bechard. International Tin Research and Development Council, 149 Broadway, New York.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

METALLURGICAL, FOUNDRY, ROLLING MILL, MECHANICAL, ELECTRO-PLATING, POLISHING, AND METAL FINISHING

ASSOCIATE EDITORS

H. M. ST. JOHN — W. J. PETTIS — W. J. REARDON — W. B. FRANCIS
G. BYRON HOGABOOM — T. H. CHAMBERLAIN — WALTER FRAINE

Brittle, Streaky Nickel

Q.—Sample of nickel solution. Deposit cracks and curls on sharp edges of corners at more than one volt. If plated at less than one volt deposits in streaks and when finally covered, the work is scummy beneath the plate. I want to know if it is advisable to operate cold. Current at more than one volt causes a black deposit on the edges. The work is cleaned with a commercial cleaner and muriatic acid.

A.—Analysis:

Metallic nickel	5.95 ozs./gal.
Chloride as ammonium chloride	3.91 ozs./gal.
pH	minus 5.2

The metal content and chloride are too high. The probable cause of the cracking and curling is the acid condition of the bath together with the low temperature. The bath should be operated at a temperature not lower than 65 deg.

Original formula:

Nickel sulfate	10 ozs./gal.
Salammoniac	4 ozs./gal.
Boric acid	4 ozs./gal.

A chloride content of 3 oz./gal. is sufficient for a cold bath and the boric acid content need not be higher than 3 oz./gal. To bring this bath back to the correct condition it will be necessary to discard 100 gal. of solution and replace with water. Add 1 oz./gal. of ammonium chloride, 1½ oz./gal. of boric acid and 4 fl. oz. per 100 gal. of ammonia (½ pint to the whole bath).

—G. B. H., Jr., Problem 5,461.

Crumbling Anodes

Q.—In the annual overhaul of our nickel plating tanks, the nickel anodes have been removed.

We notice that many of them are very porous and that pieces as thick as a man's thumb and probably half as long fall off the anodes when touched or brushed. These are removed from the tanks only once a year.

Will you please advise whether or not these anodes should be brushed, in which case a considerable part of them will be removed and destroyed; or would they act satisfactorily if handled carefully. rinsed with water under a tap and put back into the new solution without further cleaning?

A.—From the description of the scale on your anodes it is evident that you are using 95-97% nickel anodes. The scale is largely iron and carbon, which were present originally in the nickel as impurities.

It is better to clean off this scale so as to obtain free passage of the current. The small amount of nickel that is lost in doing so cannot be prevented. The action you mention is characteristic of the low purity anodes. The high purity 99 plus nickel anodes would not produce such scale.

After washing, do not allow the anodes to dry. An oxide film will form and render the metal surface passive. Gassing and consequently pitting will occur until anodes become active in solution. This condition can be remedied by making the anodes the negative pole in a 5% hydrochloric acid solution after washing and before returning to the nickel tank.

—G. B. H., Jr., Problem 5,462.

Finishing Sterling Silver

Q.—I am a plater and finisher on jewelry. I have trouble with finishing Sterling silver. I want a mirror finish. At present buff marks are left on the work. I am using cotton muslin buffs, red rouge, and candle stick.

A.—Sterling silver is usually first sand bobbed using a walrus wheel and 01½ pumice. The bobs are made according to the shape of the work. After this operation the articles are cut down with a good grade of tripoli and a full disc buff. Wash the work after this tripoli operation.

The silver is then colored with silver rouge and kerosene oil on a full disc buff. Wash work again using a soft sponge with hot soapy water to which a small amount of ammonia has been added.

Finally, fan off with a buff made of

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: ..... Employed by: .....

Kind of solution: ..... Volume used: .....

Tank length: ..... width: ..... Solution depth: .....

Anode surface, sq. ft.: ..... Cathode surface, sq. ft.: .....

Distance between anode and cathode: ..... Kind of anodes: .....

Class of work being plated: ..... Original formula of solution: .....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

canton flannel or domet cloth. Keep the face of the buff well raked out and apply very little rouge—just enough to color the silver.

—G. B. H., Jr., Problem 5,463.

Hard, Dark Nickel

Q.—My nickel deposit burns very easily. (Nickel solution for analysis). Deposit is hard; very dark luster after buffing.

A.—The nickel solution analyzes as follows:

Nickel	1.2 ozs./gal.
Chloride, as ammon. chloride	.53 oz./gal.
pH	6.8

This solution is low in metal and in chloride and the pH is too high. The boric acid content is also too low. To correct, make the following additions:

Single nickel salts	8.5 ozs./gal.
Ammonium chloride	2.5 ozs./gal.
Boric acid	2.0 ozs./gal.

After these additions have been made the pH should be checked and brought to a value of 5.8 to 6.0 colorimetric.

—G. B. H., Jr., Problem 5,464.

Nickel Solution

Q.—Please analyze this sample of nickel solution. Is it all right to use under chrome?

A.—The solution is only slightly low in metal and chloride, as follows:

Nickel	2.75 ozs./gal.
Chloride, as ammon. chloride	2.29 ozs./gal.
pH	5.2

However, the pH is too low for a high pH solution.

Add 1¼ ozs./gal. of single salts and ¾ oz./gal. of ammonium chloride. Then bring the pH up by adding ammonia. About 12 fluid ounces per each 100 gallons of the solution will be required, but the pH should be checked after the additions. This solution should be suitable for your purpose.

You are evidently carrying acid into the solution from the acid pickle. Rinse the work well in rinse water that is frequently replaced.

—G. B. H., Jr., Problem 5,465.

Oxidizing, Bronzing and Black Nickel

Q.—Under separate cover we are shipping you samples of our black nickel and bronze solution for analysis. Any help you can give us in straightening out our solutions, will be very much appreciated.

Both these solutions were made up according to the formulas in the Platers' Guidebook. As we are not getting good results we would like your advice as to how these can be fixed if possible. All work is plated in a portable barrel plater. As you will see from the samples of buckles, the black nickel does not plate an even color. We have marked all samples as to how they were finished. All work is ball burnished before plating. The black nickel after ball burnishing is run through a cleaner made up of a commercial cleaner, 6 oz. to the gallon of water; then rinsed in either acid or cyanide dip according to whether iron or brass; then rinsed and plated in nickel for five minutes and rinsed and put in black nickel for 20 min.

Our bronze solution as stated before is run according to formula given in the Platers' Guidebook, with exception of the anodes which are copper instead of bronze. We receive out of the bronze solution a very good copper color but do not get the bronze color which is needed.

We are also sending you samples of an oxidized and bronze finish, on which we would like information. These samples are plated copper and oxidized and lacquered. We would like to know if there is any way of making these finishes without the usual scratch brush to get the finish. These buckles are usually done in lots of five to ten gross at a time.

A.—Bronze solution analysis:

Copper	2.13 ozs./gal.
Zinc	.15 oz./gal.
Free cyanide	.15 oz./gal.

The copper is slightly high. First of all, however, it would be necessary to bring up the free cyanide to 1.0 oz. per gallon by the addition of .85 oz./gal. of sodium cyanide. Then add ½ ounce per gallon of Rochelle salts and warm to about 100 deg. F. The best anode to use is one containing 92% copper and 8% zinc.

Black nickel solution analysis.

Nickel	1.15 ozs./gal.
Sulphocyanate	2.0 ozs./gal.
Zinc	.51 oz./gal.
pH	6.2

This solution is O.K. as far as the above constituents are concerned. The samples which you furnished are too flat for good results in a barrel and a better finish would be obtained if the pieces were wired. The spotting is due to the contacts made in the barrel. Use only one volt on still tank work.

After oxidizing, the work can be relieved by rolling in leather meal containing a small amount of fine silica. Roll slowly, about 10-15 rpm. and continue until the correct color is obtained. Use plenty of leather meal so that the metal parts will not be scratched by coming in contact with each other.

—G. B. H., Jr., Problem 5,466.

Rose Gold Solution

Q.—We would like to be advised upon a rose gold formula. For the past 15 years we have been making a rose color by boiling down several pots of new 24K gold and then using this solution as a rose color. Kindly advise us how we can maintain a good rose color with a nice smut, without using the above process.

A.—A comparatively inexpensive rose gold may be obtained by using the following procedure, provided that the base metal to be plated is brass:

Dip articles to be plated in a solution of:

Copper sulphate	16 ozs.
Hydrochloric acid	½ gal.
Water	1 gal.

Dissolve the copper sulphate in water then acid. The work should have a deep red smut which should be lightened by placing in a saturated salt solution for a few seconds.

After a red smut has been obtained on work, plate in the following gold solution:

Yellow prussiate of potash	4 ozs.
Potassium carbonate	4 ozs.
Sodium cyanide	½ oz.
Gold as fulminate	10 dwt.
Water	1 gal.

Temperature, 175 deg. F., 6 volts.

Time, 15 to 20 seconds.

Relieve high lights with sodium bicarbonate, replate in gold solution, rinse, dry and lacquer.

—T. H. C., Problem 5,467.

Spray Finishing

Q.—Enclosed you will find an ornament. We would appreciate it very much if you could tell us how the finish is made.

A.—The sample as submitted is finished in the following manner:

1. Entire article buffed and colored.
2. High lights or raised portions masked.
3. Sprayed with bronzing liquid and fine brass powder.
4. Mask removed, sprayed with clear lacquer to which gold dye has been added to protect masked portion and to give entire surface a gold appearance.

—T. H. C., Problem 5,468.

Stainless Steel Etching

Q.—The writer is investigating the commercial possibilities of a certain application requiring stainless cutlery steel having an approximate analysis of 18% chrome and 0.7% carbon. This steel will require etching on a bright tempered surface.

I would appreciate receiving your recommendations as to the best method and material for doing the etching. The etching in this case would be required to be of medium depth.

Is it possible to secure an etching material for the purpose made up in paste form so that it can be applied with stencil?

A.—The following solutions can be used for stainless steel etching:

1. Nitric Acid 32 ozs.
   Hydrochloric acid 3 ozs.
   Denatured alcohol 16 ozs.
   Water 96 ozs.
   Solution used cold.
2. Ferric chloride 20 grs.
   Hydrochloric acid 60 grs.
   Water 60 cc.

This solution may be used warm at 120 deg. F. or electrolytically.

—T. H. C., Problem 5,469.

Practical Brass Foundry Digest

By H. M. ST. JOHN

Chief Metallurgist, Detroit Lubricator Company; Associate Editor, Metal Industry.

Short Abstracts of Articles of Interest to Practical Non-Ferrous Foundrymen and Metallurgists.

Foundry Practice for Large Non-Ferrous Castings. M. C. Oldham. Metal Industry (London), Vol. 47, p. 483, Nov. 15th, 1935.

The great diversity of non-ferrous alloys employed in any foundry dealing with a wide range of requirements is responsible for many serious problems. Of these the most important have to do with the casting temperature and the contraction of the metal during the freezing range. Many defective castings would be eliminated if pyrometer control could be substituted for the human eye but with some alloys this is difficult. The author thinks that the open-end couple is not sufficiently reliable and that most methods of protecting the welded junction result in too much time lag. He suggests coating the junction with a thin wash of refractory cement which must be renewed frequently. Alloys like P.M.G. metal (88 copper, 10 silicon hardener, 2 zinc) have a much shorter freezing range than ordinary 88-10-2 and require special care in gating, but if this care is taken exceptional strength and tightness against fluid pressure can be obtained. A method for determining freezing range is described and illustrated. Cylindrical castings up to 30 ft. in length, with a machined weight of 6 tons, have been cast horizontally at a uniform casting temperature from end to end, with resulting uniform contraction and grain size.

The Expansion and Contraction of Moulding Sand at Elevated Temperatures. H. W. Dietert and F. Valtier. Trans. Amer. Foundrymen's Assoc. Vol. 6, p. 107 (Dec. 1935).

The authors describe a series of experiments with the thermal expansion and contraction of moulding sands. Different sands vary with respect to these factors. Surface defects, such as scabs, may often be traced to excessive volume changes of the sand in the mould. These changes are influenced by grain size, clay content, moisture content and the hardness with which the mould has been rammed; they may be controlled by a proper adjustment of these factors.

Molds Numerous Types of Bronze Castings. Anon. Foundry, Vol. 63, page 30 (Dec. 1935).

Describes practice at the plant of the Erie Bronze Company, Erie, Penna.

Temper-Hardening of Commercial Nickel-Coppers Containing Phosphorus. E. C. Rollason and T. G. Bamford. Metals and Alloys, Vol. 6, page 345 (Dec. 1935).

Experiments were conducted with copper castings containing from 1.72 to 2.33 per cent nickel, from 0.03 to 0.11 per cent phosphorus. Slow cooling from an annealing temperature of 850°C (1562°F) resulted in Brinell hardness from 45 to 67 as compared with 37 to 39 when the castings were quenched. The slowest rate of cooling produced the greatest hardness. Quenching from 800°C (1472°F), followed by tempering at 500°C (932°F) produced a hardness above 80 Brinell in castings containing 1.73 nickel and 0.11 phosphorus. Apparently appreciable temper hardening does not occur unless both nickel and phosphorus are present. The improvement in the elastic limit of the treated castings was particularly marked, increasing from 0.8 tons per sq. in. as quenched to 7.0 tons per sq. in. after tempering at 500°C for 30 minutes.

Corrosion Resistance of Copper Alloys. N. W. Mitchell. Metal Progress. Vol. 28, page 38 (Dec. 1935).

Copper alloys, cast as well as wrought, are subjected to varying corrosive conditions which dictate variations in composition for successful use. Water, particularly at high temperatures, tends to cause dezincification in copper-zinc alloys containing less than 80 per cent copper (even with 1 per cent or more of tin in the alloy). Alloys containing 85 per cent or more of copper are free from this defect. The copper-tin alloys are highly resistant to atmospheric corrosion and useful, in many cases, under acid conditions. The silicon bronzes, of which 96 copper, 3 silicon, 1 tin is typical, sand cast well and have high physical properties as well as unusually high corrosion resistance, equal or superior to that of pure copper. Copper-nickel alloys, copper-aluminum alloys (containing 5 to 10 per cent aluminum) and copper-nickel-aluminum alloys have points of superiority when properly selected for the intended service. The last named is especially useful.

Sulphur Absorption in Metal Melting. F. J. Bullen. Metal Industry (London), Vol. 47, page 540.

Experiments were carried out to determine whether metal melted in clay-graphite crucibles might be contaminated with sulphur from a high-sulphur fuel oil by penetration through the walls of the crucible. The alloy employed was a high-tin nickel bronze. Fuel oil containing 2.85 per cent sulphur was used. No contamination was found and the physical properties of the castings were on a par with those made from coke-fired furnaces.

Large Centrifugal Castings. Anon. Metal Industry (London), Vol. 47, page 585.

A description of practice at the Sheffield plant of Messrs. Millspaugh, Ltd., who make both bronze and steel tubes for the paper machinery industry. Bronze tubes 44 inches in diameter, 30 feet long, weighing 50,000 lbs., have been cast centrifugally. The bronze is melted in oscillating oil furnaces of 13,000 lbs. capacity and poured into the casting machine from ladles at a rate as high as 20 tons in 100 secs. The machines are of the water-cooled horizontal type, driven by steam power. The moulds are lined with a rammed refractory.

New Patents

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

A Review of Current United States Patents of Interest

1,998,467. April 23, 1935. **Method of Treating Aluminum-Base Alloys.** Philip T. Stroup, New Kensington, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,998,496. April 23, 1935. **Process of Surface Plating of Metals With Alloys.** Marcell Fiedler, Bound Brook, N. J.

1,998,506. April 23, 1935. **Mounting for Leaf and Powdered Metals.** William S. Jones, Windsor, Conn.

1,998,516. April 23, 1935. **Method for Uniting Steel and Bronze Intimately With One Another, and an Improved Mold for Carrying Out This Method.** Arthur Monzer, Berlin-Pankow, Germany.

1,998,627. April 23, 1935. **Apparatus for the Metal Lining of Pipes.** Frederick A. Kormann, Glendale, Calif., assignor to Industrial Research Laboratories, Ltd., San Francisco, Calif.

1,998,654. April 23, 1935. **Method for Forming Joints in Metal Tubing.** Theodore Briegel, Moline, Ill.

1,998,744. April 23, 1935. **Baking Enamel.** Richard T. Ubben, Wilmington, Del., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del.

1,998,770. April 23, 1935. **Method of and Apparatus for Grinding and Polishing Flexible Sheets.** Louis Schulte, Cleveland, Ohio, assignor to Schulte Grinding and Polishing Machine Company, Incorporated, Cleveland, Ohio.

1,998,892. April 23, 1935. **Packing.** Tillman J. Braden, Kalamazoo, Mich., assignor to Durametallic Corporation, Kalamazoo, Mich.

1,998,905. April 23, 1935. **Apparatus for Applying Abrasive to Belts, Polishing Wheels, or the Like.** Joseph S. Porter, New Haven, Conn., assignor to D. & H. Scovil, Incorporated, Higganum, Conn.

1,999,042. April 23, 1935. **Aluminum Reflector Surface and Method of Producing the Same.** Junius D. Edwards, Oakmont, Cyril S. Taylor, New Kensington, and Welker Wallace Wentz, Pittsburgh, Pa., assignors to Aluminum Company of America, Pittsburgh, Pa.

1,999,114. April 23, 1935. **Composite Metal Strip and Method of Making Same.** Glenn L. Sherwood, Cleveland, Ohio, assignor to The Cleveland Graphite Bronze Company, Cleveland, Ohio.

1,999,382. April 30, 1935. **Refractory Material for Use in Metal Castings and Process for Making the same.** Arthur S. Weygandt, Cleveland Heights, Ohio, assignor to The Grasselli Chemical Company, Cleveland, Ohio.

1,999,408. April 30, 1935. **Electrolytic Apparatus.** Philip E. Edelman, Chicago, Ill., assignor, by mesne assignments, to Robert T. Mack, trustee, Chicago, Ill.

1,999,628. April 30, 1935. **Wetting Out, Cleaning, and Emulsion Agents in a Solid Grindable Form.** Peter Friesenhahn, Berlin-Grunewald, Germany, assignor, by mesne assignments, to "Unichem" Chemikalien Handels A.-G., Zurich, Switzerland.

1,999,629. April 30, 1935. **Detergent.** Peter Friesenhahn, Berlin-Grunewald, Germany, assignor, by mesne assignments, to "Unichem" Chemikalien Handels A.-G., Zurich, Switzerland.

1,999,630. April 30, 1935. **Detergent Compositions.** Peter Friesenhahn, Berlin-Grunewald, Germany, assignor, by mesne assignments, to "Unichem" Chemikalien Handels A.-G., Zurich, Switzerland.

1,999,631. April 30, 1935. **Detergent Composition.** Peter Friesenhahn, Berlin-Grunewald, Germany, assignor, by mesne assignments, to "Unichem" Chemikalien Handels A.-G., Zurich, Switzerland.

1,999,632. April 30, 1935. **Detergent Composition and Process.** Peter Friesenhahn, Berlin-Grunewald, Germany, assignor, by mesne assignments, to "Unichem" Chemikalien Handels A.-G., Zurich, Switzerland.

1,999,850. April 30, 1935. **Copper-Iron Alloy.** Cyril Stanley Smith, Cheshire, and Earl W. Palmer, Waterbury, Conn., assignors to The American Brass Company, Waterbury, Conn.

1,999,864. April 30, 1935. **Alloy.** Edward A. Capillon, Attleboro, Mass., and Frederic E. Carter, Maplewood, N. J., assignors to Baker & Company, Inc., Newark, N. J.

1,999,865. April 30, 1935. **Alloy.** Edward A. Capillon, Attleboro, Mass., and Frederic E. Carter, Maplewood, N. J., assignors to Baker & Company, Inc., Newark, N. J.

1,999,866. April 30, 1935. **Alloy.** Edward A. Capillon, Attleboro, Mass., and Frederic E. Carter, Maplewood, N. J., assignors to Baker & Company, Inc., Newark, N. J.

1,999,961. April 30, 1933. **Method and Apparatus for Die Casting.** John R. Daesen, Oak Park, and Leland E. Wemple, Chicago, Ill.

2,000,115. May 7, 1935. **Alloy.** Robert T. Wood, Cleveland, Ohio, assignor, by mesne assignments, to Magnesium Development Corporation, a corporation of Delaware.

2,000,488. May 7, 1935. **Die Casting Machine.** Torbjorn C. Korsmo, Madison, Wis., assignor to Madison-Kipp Corporation, Madison, Wis.

2,000,740. May 7, 1935. **Alkali Metal Alloy.** Dorothy Hall Brophy, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York.

2,000,801. May 7, 1935. **Dental Casting Machine.** Chris S. Van Horn, Bloomsburg, Pa.

2,001,134. May 14, 1935. **Metal Powder.** Charles Hardy, Pelham Manor, N. Y., assignor to Hardy Metallurgical Company, a corporation of Delaware.

2,001,385. May 14, 1935. **Electrolytic Deposition of Nickel From Nickel Salt Solutions.** Anton Martin Gronningsaeter, New York, N. Y., assignor to Falconbridge Nickel Mines Limited, Toronto, Ontario, Canada.

2,001,427. May 14, 1935. **Art of Coloring Aluminum Articles.** James Francis Leahy, Fairhaven, Mass., assignor to Atlas Tack Corporation, Fairhaven, Mass.

2,001,474. May 14, 1935. **Process of Tin Plating.** Francis H. Snyder, Niagara Falls, N. Y., and Stanley F. M. Maclaren, Niagara Falls, Ontario, Canada, assignors to Industrial Research, Limited, Niagara Falls, Ontario, Canada.

2,001,639. May 14, 1935. **Silver Solder.** Harold Turner, Sheffield, England, assignor to Johnson Matthey & Company, Limited, London, England.

2,001,753. May 21, 1935. **Coated Copper Articles and Method of Making the Same.** Robert R. Tanner, Highland Park, and John S. Thompson, Detroit, Mich., assignors to Metal Finishing Research Corporation, Detroit, Mich.

2,001,754. May 21, 1935. **Method and Material for Producing Phosphate Coating.** John S. Thompson and Van M. Darsey, Detroit, Mich., assignors to Metal Finishing Research Corporation, Detroit, Mich.

2,001,760. May 21, 1935. **Method and Machine for Processing Collapsible Tubes.** Edwin H. Barker, Moylan, Pa., assignor to A. H. Wirz, Inc., Chester, Pa.

2,001,808. May 21, 1935. **Furnace for Producing Purified Metals.** Maurice L. Wood, Waterbury, Conn., assignor to The Chase Companies, Incorporated, Waterbury, Conn.

2,002,198. May 21, 1935. **Surface Hardening Metal Articles.** William A. Wissler, Flushing, N. Y., assignor to Haynes Stellite Company, a corporation of Indiana.

Equipment

New and Useful Devices, Metals, Machinery and Supplies.

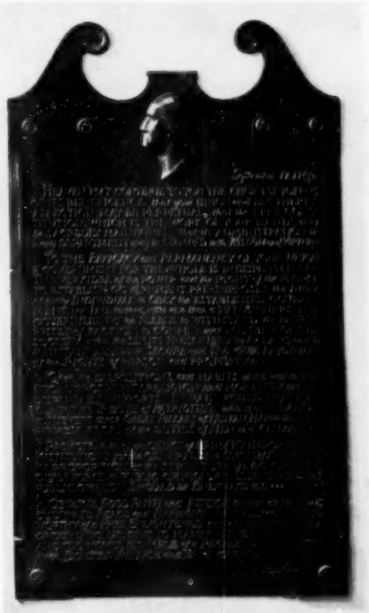
New Alloy for Making Molds for Plastics

In its January issue, Bakelite Review, published by the Bakelite Corporation, 247 Park Ave., New York, describes the increased opportunities afforded plastics due to the recent development of cast beryllium-copper molds. This development is the result of two years of carefully planned experimental work carried on by the Bronze Division of the Gorham Company, silversmiths.

"Difficulties encountered in producing tool steel molds and pack hardened steel molds are responsible for the high cost of molding dies," says the **Review.** It is pointed out, however, that beryllium copper should be considered supplementary to the mold materials now employed and not a panacea or cure-all. The plastic industry should consider cast beryllium copper as a new tool. Like all new tools, it will be some time before its true place in the industry will be determined.

Among other details the article explains the suitability of beryllium copper for cast molds, the type of molded pieces for which these molds can be employed to greatest advantage, the mechanical properties of beryllium copper, and its apparent present limitations.

In referring to the types of cast beryllium copper molds which can be produced economically, Bakelite Review states, "(1) For small parts of intricate design where the hob would be too fragile to stand up in the reproduction of cavities in mild machine steel, and (2) for decorative ornamental designs where reproduction is obtainable in steel only by expensive hand engraving."



Large molded placque, 3 ft. x 2 ft., demonstrating possibilities of cast beryllium copper molds. Produced in Bakelite molded by cast beryllium copper mold.

Precious Metal Plates

With the advent of electroplating, the original Sheffield plate gradually passed out of existence. However, the use of an alloyed gold veneer continued, which is, to-day, known as rolled gold plate or gold filled.

Precious clad metals manufactured by the General Plate Company, Attleboro, Mass., are similar in construction to the original Sheffield plate. Rolled gold plate is made by affixing a sheet of karat gold to a bar of strengthening and supporting metal. This gives a hard durable wearing surface of gold. An article can bear this quality stamp only when made in accordance with requirements of the U. S. Department of Commerce, Standard No. C.S. 47-34. The rolled gold plate is obtainable either on strip, wire or tube. The base metal is covered with a layer of pure nickel, which is in turn covered with gold.

Precious clad metals are now used to a considerable extent in the electrical industries as well as in the jewelry and optical fields.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Air Eliminator. For removing entrained air from cold steam systems; for use on the Anderson Super Silvertop steam trap. V. D. Anderson Company, 1935 W. 96th St., Cleveland, Ohio.

"Thermospeed" Separable Well Tube Systems. For temperature measurement and control applications. Taylor Instrument Companies, Rochester, N. Y.

Nishelad Reflector Unit. Reflecting surface of commercially polished aluminum. Dura Products Manufacturing Company, Canton, Ohio.

"Do-All" Band Polishing Machine. For use in tool rooms. Performs the function of internal and external precision band sawing with narrow blade band saws. Continental Machine Specialties, Inc., 1301 Washington Avenue, S., Minneapolis, Minn.

9-Inch Workshop Lathe; 1936 model. Obtainable with V-belt drive. South Bend Lathe Works, 426 E. Madison Street, South Bend, Ind.

Complete Line of Air Compressors. Single and double stage units in the permanent and portable styles. Also a complete line of hydraulic and screw presses. Distributed through Industrial and Mill Supply accounts. Wright Manufacturing Division, American Chain Company, Inc., York, Pa.

Barco Flexible Ball Joints, for oil, steam, air, gasoline, tar, water and other fluids, gases and liquids where a flexible conveyor is required. Recommended for electroplating plants. Barco Manufacturing Company, 1801 Winnemac Avenue, Chicago, Ill.

Heavy Duty Floorsteel; non-skid, longer-life floors. Acme Steel Company, 2836 Archer Ave., Chicago, Ill.

Air Caps For Spray Guns; developed especially for Type MBC. DeVilbiss Company, Toledo, Ohio.

Hydraulic Press, with self-contained hydraulic power unit, using oil as the fluid medium. Farrel-Birmingham Company, Inc., Ansonia, Conn.

Flexlock Joint. A product of the B. F. Goodrich Company, Akron, Ohio. Now available for use with specially constructed ceramic pipe in low pressure service.

Dustube Collector

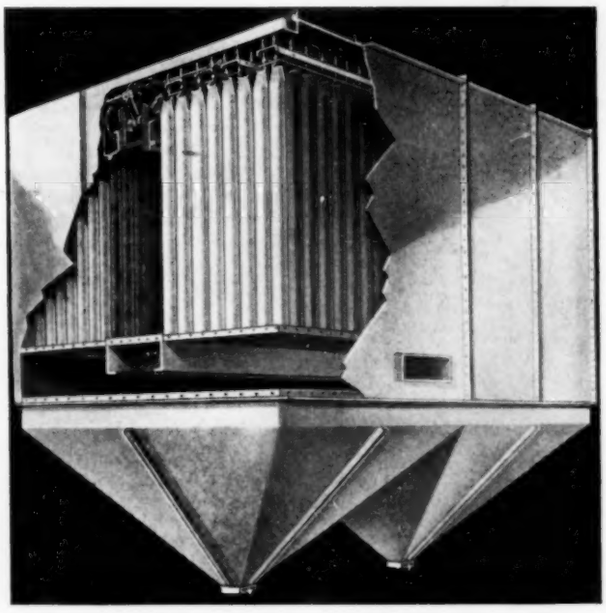
What is claimed to be the most practical and simplest operating Dust Collector ever built, is announced by The American Foundry Equipment Company, 408 Byrkit Street, Mishawaka, Indiana, and is called "The American Dustube Collector."

The heart of the Dustube Collector is the long tube made of special woven fabric best suited for filtering of ordinary dust, and this fabric can be changed to suit the specific installation. The tubes are hung from racks in the ceiling. Self-acting dust seals hold the tubes to the bottom, without clamps, bands, or intricate devices. Spring suspension of the dust tubes maintain the proper tension on the cloth making it easier to insert or take out dust tubes when desired.

In this multiple tube design every tube works independently. In the case of a damaged tube, it can be easily unhooked, rolled up and placed in the inlet seal at the bottom, thus sealing the opening temporarily, without interfering with the operation of the complete equipment. All tubes are easily accessible and new ones can be inserted in less than five minutes.

The tubular design of the American Dustube Collector, it is claimed, insures low operating and maintenance cost. Because of the large air chamber and the open design of the tube inlets, the suction within the casing is very low. This not only means a larger saving in fan horse power, but there is less wear by erosion on the interior of the equipment. Also, this design, it is stated, eliminates the possibilities of stacking or caking of dust in the tubes which would retard efficiency, increases fan horse power consumption and increases the maintenance cost.

This simplified type of Dustube Collector can be applied to many old or worn-out Dust Arrestors now installed.



Dustube Collector

A Plastic Insulation

A growing demand is reported by Botfield Refractories Company for Ada-Stic Plastic Insulating Cement, a product added to their line in the past few months. Ada-Stic is claimed to be the most efficient insulation up to 2000°F.; has guaranteed coverage; costs less per job, less to install and less to maintain; is reclaimable, requires no other material to secure a fine finished surface. Can be applied by hand, trowel, or Botfield's cement spraying equipment. Ada-Stic, it is stated, will adhere firmly to any clean surface, is very tough and will stand up under hard usage; can be said to have no shrinkage. Circular may be secured by writing Botfield Refractories Company, Swanson & Clymer Streets, Philadelphia, Pa.

Resistor Type Rocking Electric Furnace

The Detroit Electric Furnace Company, 825 West Elizabeth Street, Detroit, Michigan, announces the preliminary test and manufacture of a resistor type rocking furnace. This unit is expected to be especially useful for low temperature melting operations and may have special value in the chemical field. The broad principles of the furnace are old, the rocking mechanism and control being similar to that already used on present-day Detroits. To the Detroit rocking furnace mechanism a resistor element has been adapted by mounting a graphite resistor on the central axis of the furnace and connecting it to a special transformer. It is expected that unusual temperature flexibility and control will be derived.

According to a statement by the Company, equipment of this type has been built and is being tested for operating results to better evaluate its usefulness in the melting field. If successful, it is expected that units in several sizes will be promptly offered to the United States market.

Re-Made Buffs

The J. J. Siefen Company, 1936 W. Lafayette Boulevard, Detroit, Mich., has developed a method of reclaiming old buffs by making the small worn down buffs suitable for re-use. The old buff is cut into sections, six to the complete circle and these six sections mounted on a steel hub which forms a new large sized buff. These sectors are cut in a steel die which produces a uniform, fairly well balanced section. The wheel can be balanced later if necessary by using lead or steel washers on any of the twelve pins in the re-assembled buff.

Buff users are invited to send their old 8 or 9-inch buffs to the Siefen Company who will cut them up, remount and send the complete unit back for a trial. Send six for each new section desired. The hub is designed to permit air to enter center of the buff, ventilating it and adding to its life.

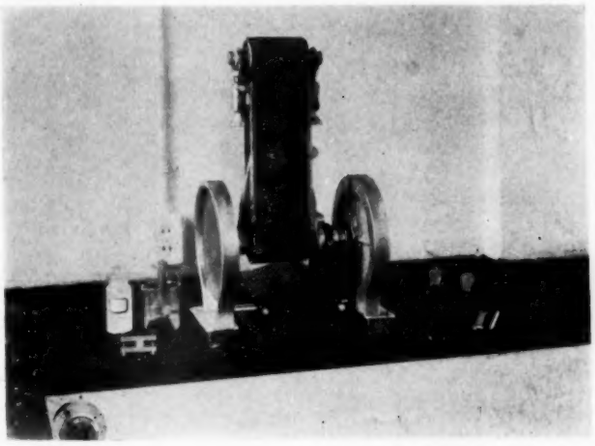
Metallographic Polisher

As a companion piece to the Bausch & Lomb Electroplater's Microscope, the H-VW-M Metallographic Polisher has been developed recently by the Hanson-Van Winkle-Munning Company of Matawan, New Jersey, to be used for preparing a specimen for the measurement of plate thickness.

The polisher consists of a surface grinder with two fabric covered wet polishing disks mounted on the same chassis. The surface grinder may be operated in a horizontal or vertical position and carries a 4 x 36 inch belt set up with metallographic emery. Adjustments are provided to insure proper tension and tracking of the belt.

The wet polishing disks are mounted vertically on either side of the driving shaft and are encased in adjustable cast aluminum splash guards. The polishing cloths are held in place by a spring which fits into a groove in the periphery of the disks thus insuring even tension and perfect balancing of the disks. A removable pan is placed under each splash to collect excess polishing suspension. A 1/3 H.P. 1750 RPM motor is recommended to drive the machine.

To prepare a specimen, suitable sections are sawed from the plated article and mounted on a clamp that is provided with the outfit. Filing with a coarse file and then a No. 2 Pillar file produces a surface that is sufficiently even for polishing. The specimen is first ground on the dry fine emery belt and then on the first disk covered with duck. A very fine metallographic emery suspension in water is applied to the disk with a camel hair brush during this operation. The final polishing is carried out on a disk covered with broadcloth to which a suspension of levigated alumina is applied. After washing, drying and in most cases etching, the specimen is ready for examination under the microscope. The preparation of a specimen which may contain up to 24 sections requires 30 to 60 minutes.



H-VW-M Metallographic Polisher

Grinders and Buffers

The Marschke line of electric buffers and grinders, floor stand and bench type, and swing frame grinders include a wide variety of types and sizes. It offers a complete range of choice for the requirements of small shops and large production plants in every branch of the metal working industry. This line is manufactured by the Vonnegut Moulder Corporation, 1803 Madison Avenue, Indianapolis, Ind.

The line begins with a 1 H. P. bench and pedestal grinder 10" x 1½" wheel and a 1 H. P. buffer for 2" width buffing wheel. There are 1, 2, 3 and 5 H. P. Marschke grinders and buffers of similar type with direct motor drive, one-piece, double-end shafts and there are also combination grinders and buffers with the same range of motor sizes. All of the machines are furnished on pedestal or for bench mounting; also available for direct current or alternating as required.

The Marschke line includes swing frame grinders in sizes ranging from 3 H. P. motor with 12" wheel to 15 H. P. with 24" wheel.

Rust Preventives

Penlaco Rust Preventives, manufactured by Penola Inc., 30 Rockefeller Plaza, New York, and marketed by the Esso Marketers, are currently being introduced throughout the eastern states, according to an announcement made last week by the Standard Oil Company of New Jersey, one of the group of companies comprising the Esso Marketers. The other companies in this group are the Standard Oil Companies of Pennsylvania and Louisiana and the Colonial Beacon Oil Company, Inc.

Penlaco Rust Preventives are protective, varnish-like compounds which are spread on metal surfaces by wiping, brushing, dipping or spraying. They dry to a hard film, which is impervious to water and capable of sealing the surface from air, thus effecting a long-time protection of metal against rust. Penlaco Rust Preventives are available in a variety of grades, ranging from a thin, fast-drying product to a heavy, general-purpose grade. No other rust preventive or paints need be used with them.

These new preventives are a combination of a volatile solvent with a non-volatile portion. Skillful processing, blending and controlling of the long oil spar-varnish in the non-volatile base imparts outstanding adaptability and service characteristics. Penlaco Rust Preventives are designed primarily for use where a dry, durable, non-removable, protective coating which is transparent and water resisting, is desired.

New Cathode Rod

J. Nelson and Son, 830 N. Wells Street, Chicago, Ill., have developed a patented cathode rod for use in plating tanks. It was perfected in their own plating shop and has been used on their own work for several years.

The rod is made of brass and phosphor bronze, and can be used to replace the old rod without any extra installation expense. The following advantages are claimed:

Assures positive contact.

Reduces loading and unloading time 50 per cent.

Requires no cleaning.

Used with wire, hooks or racks.

Enables one man to hang in heavy pieces without help.

Reduces idle tank time.

Spectrum Measuring Microscope

A new spectrum measuring microscope has just been designed in the laboratories of Bausch & Lomb, Rochester, N. Y., for the rapid and precise measurement of the linear intervals between spectrum lines on the photographic plate. Its precision and accuracy, however, are said to make it applicable to a wide range of work, such as the measurement of thermal expansion of metals and the elongation of test specimens in creep tests under load.

The object to be measured is carried in a horizontal position upon a sliding table to which a glass scale is rigidly attached. The object is therefore in constant fixed relation with a measuring device which is itself constant.

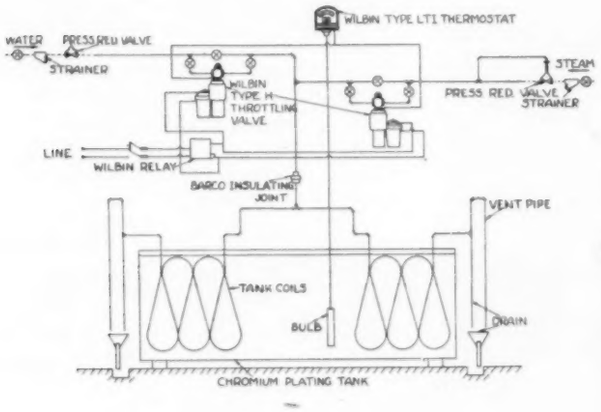
For the operator who is measuring spectrum lines, there is added to the observing microscope, behind the objective, a small slide carrying interchangeable spherical and cylindrical lenses. When the cylinder is in position and adjusted so that its axis is perpendicular to the spectrum line, the images of the individual silver grains are drawn out into overlapping lines giving the image a smooth appearance in which all evidence of grain is absent.

Temperature Control

The Wilbin Instrument Corporation, 40 East 34th Street, New York, has designed instruments to control temperature by starting and stopping electric motors through the use of thermostats. These thermostats operate directly from the lighting current and on A.C. current can handle up to 1000 watts or ½ H. P. motor without the need of a relay. They are available in four types for temperatures from minus to 40 deg. F. to plus 650 deg. F., with long or short ranges and sensitivities down to ½ deg. F., for all commercial applications in heating, cooling, air conditioning and refrigeration.

The Wilbin motor valves are actuated by oil pressure on a powerful plunger instead of by gears, reversing motors or other intricate mechanisms. Thermostatic switches start and stop a small motor driven pump to open or close a single seated valve of any size for a temperature difference of as little as ½ deg. F.

The illustration shows a layout for controlling the temperatures of a chromium plating installation.



Wilbin Twin Throttling Temperature Control for Chromium Plating Tanks

Copper Base Alloy

Mallory 3 metal is a new alloy developed by P. R. Mallory and Company, Inc., Indianapolis, Ind. The metal is said to be characterized by a combination of high mechanical strength and high electrical conductivity. It consists essentially of copper and has a coefficient of resistivity, coefficient of expansion and modulus of elasticity the same as that of pure copper; also the same corrosion resistance.

The following table gives the physical properties of the material in the form of rods and castings.

	Elastic Limit lbs. per sq. in.	Ult. Strength lbs. per sq. in.	Elon. in 2" %	Brinell Hardness	% Conduct (Cu-100%)
Mallory 3 rods	50,000	70,000	15	140	80
Mallory 3 castings	25,000	50,000	25	110	75

Mallory 3 sand castings, it is stated, have a high impact strength which is retained at elevated temperatures. The creep strength is said to be twice that of hard drawn copper at 100 deg. C., and the same applies to the fatigue strength.

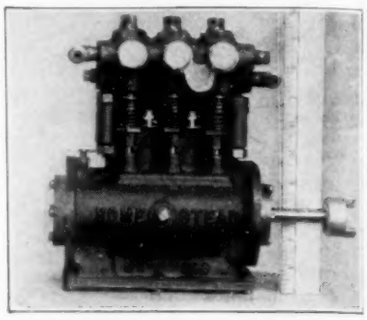
One of the great advantages claimed for Mallory 3 metal is that it will not lose its hardness or strength when heated for relatively long periods at temperatures of 400 to 500 deg. C. This allows not only soft soldering operations, but brazing with a silver solder which has a low melting point.

Mallory 3 metal is recommended by the manufacturers for spot welding tips, flash welding, dies and seam welding wheels. It may be substituted also for brass, copper and bronze, in many instances. It can be supplied in the form rods, bars, dies, drop forgings, regular forgings, cold drawn, swaged, cold headed or extruded parts and sand castings.

Small Capacity Positive Displacement Pump

There has long been a great need for a small pump to handle fluids at a relatively high pressure and at the same time in small quantities. To fill the gap that exists between the mechanical lubricator type and rotary centrifugal type, the Homestead Valve Manufacturing Company of Coraopolis, Pennsylvania, has developed the pump shown—a miniature triplex plunger reciprocating pump.

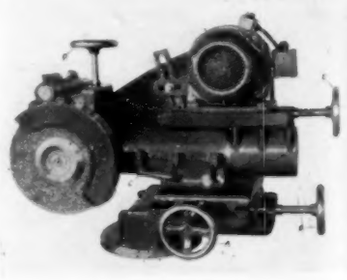
Depending upon the speed of the pump the capacity may be varied from about 15 to 120 gallons per hour. The power required by the pump is small, such that a ¼ horsepower electric motor will operate the pump at 60 gallons per hour capacity and 200 pounds pressure. It is a single acting plunger type having three cylinders of ¾" bore and 5/8" stroke with the plungers attached to cross-head guides which are driven by connecting rods from the crank shaft. The Monel metal inlet valves are of the poppet type, positively actuated through a cam and tappet mechanism and the outlet check valves are of the ball type with adjustable limited lift for high-speed operations. The gears, crank shaft, connecting rods and cross-heads are entirely enclosed in a crank case with splash lubrication. The crank case is made of semi-steel. The cylinder head is made of a corrosion-resisting iron alloy and is removable from the crank case effecting economical maintenance.



Homestead Plunger Pump

Portable Motor Driven Worm Thread Grinder

The cut below shows a side view of a new portable, motor driven, worm thread grinder made by the Hisey-Wolf Machine Company, Cincinnati, Ohio. The machine with grinding wheel has a wheel guard, hand wheel A for cross feed adjustment, clamp lever C for locking the spindle after the grinding wheel has been adjusted to the desired angle, hand wheel D for raising or lowering the grinding spindle and hand wheel E for adjusting the motor.



Hisey-Wolf Grinder

The crank handle F (through worm and worm gear) affords angular adjustment for the complete grinding head, either to the left or to the right as shown.

A universal wheel dressing attachment can be furnished for retruing bevel and straight face wheels when mounted on either end of the grinding spindle. It is provided with screw feed adjustment and graduated so that same can be accurately set up at any angle. The diamond holder can be mounted on either side of the wheel and is provided with a graduated feed.

This grinder is made in three sizes —1, 3 and 5 H.P. for any voltage, alternating current or direct current.

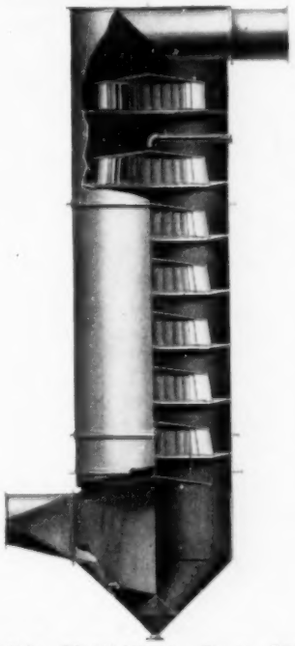
Multi-Wash Dust Collectors

Schneible Multi-Wash Dust Collectors are said to be simple in design, consisting of a series of impingement plates arranged one above the other in a cylindrical tower. Contaminated air is introduced into the tower below the bottom plate, heavy particles falling into the settling cone—lighter particles being caught by the impingement spray as they rise in the tower. They claim the following mechanical advantages: there are no moving parts, pockets or dead zones and have nothing to wear, adjust or maintain.

For dewatering the sludge the Schneible Multi-Louver Dewatering Tank is used, which precipitates the sludge to the bottom, the water or other cleansing liquid going over the top to be recirculated or wasted. Silica sludge is reduced in moisture content to 12% or less, depending on the period of precipitation.

Dewatering Tanks are arranged for dumping into trucks, wagons or railroad cars and are used in series, their number being dictated by the quantity of sludge to be handled.

The Claude B. Schneible Co., 4755 N. Crawford Ave., Chicago, have just issued a new Bulletin No. 32 which describes the Schneible Method of Dust Suppression.



Schneible Multi-Wash Dust Collector

Metal Spray Machine

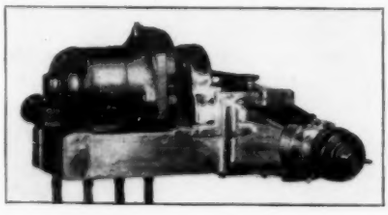
The Gillord Metal Spray machine offered by the Gillord Sales Corporation, 420 Lexington Avenue, New York, uses wire size .148″ in diameter (or American S. & W. gauge No. 9) and will, it is claimed, spray from 12 to 15 pounds of steel and steel alloys per hour; 25 to 35 pounds of copper, brass and bronze per hour; and a relatively larger volume of zinc, babbitt, lead, cadmium, and other metals of lower melting points. The operating process is as follows:

The .148″ wire is fed through a guide to knurled feed roles, driven by an electric motor, all of which is independent of the operation of the melting flame and gas blanket.

These rolls feed the wire through another guide and an orifice into the melting chamber in the head of the tool, where it is melted, picked up by a blanket of inert gas and delivered to the surface of the metal desired to be coated.

The oxygen and acetylene gases from the tanks are delivered through calibrated metering jets into the head of the machine, where they then pass through several mixing devices and are made into a composite gas before being delivered to the orifices for burning and supplying the heat for melting the metal.

The machine requires compressed air, which is delivered in a main stream out of which is metered a sufficient amount to complete the combustion for melting purposes, while the main air stream proceeds through other mixing chambers after it has received an injection of gas to neutralize its oxidizing qualities, and is delivered in the form of a pipe or blanket which protects and insulates the metal while it is being melted, carried to, and deposited on the surface treated, eliminating any contact with atmospheric conditions.



Gillord Metal Spray Machine

The manufacturers state that the high rate of spray, together with the reduction in the cost of the metal by virtue of handling it in a size that can be bought at base price without the extra drawing charge, and the smaller amounts of gas used per pound of metal, result in the reduction of the cost of using sprayed metal to a point where it is economically available for heavy work of relatively low value.

Purolator for Sandblasting

Patents have been allowed to Motor Improvements, Inc., 365 Frelinghuysen Avenue, Newark, N. J., developer of filters for numerous industrial purposes, covering an improved Purolator Air Separator which sandblast operators have told the company will result in a better finished product and a great reduction in the cost of this method of metal finishing. Tests in the company's sandblasting chamber, according to officers of Motor Improvements, Inc., have confirmed these statements.

For fine work, the operator has donned a gas mask and entered the sandblasting room with his work, receiving his supply of air from the compressed air line. This method, though resulting in increased speed and a finer product, has been impractical as regular procedure because of the fact that even brief subjection to the compressed air has frequently brought on illness due to the presence in the air of fumes of over-heated oil in the air compressor.

The new Purolator Air Separator, it is claimed, absorbs these fumes and removes as well the oil and water moisture from the air so that pure breathable air is delivered to the operator's mask.

World's Largest Plating Tank

The second of two electroplating tanks, claimed to be the largest of their kind ever built, has been recently designed and manufactured by Gross Engineering Corporation, 2163 West 105th Street, Cleveland, Ohio, for an Evansville, Ind., firm. This tank is to be used in connection with the Alumilite process of producing colored finishes on large aluminum automobile body stampings without the aid of paint or varnish. It it thirty-eight feet long, six feet six inches wide and four feet six inches deep. In order to maintain the Alumilite solution at the proper temperature a double-bottomed water-jacket containing 800 feet of lead steam piping is provided between inner and outer shells. All parts exposed to the corroding effect of the solution are either lead or lead-coated by

the Gross "Leadhesion" process. The outer tank is of lead-coated steel plates, and the inner one is of heavy-gauge lead sheets supported by strong steel mesh. The fume-removal system consists of a slotted hood surrounding the upper part of the tank just above the solution level; thus the vapor is removed as soon as formed. The total weight of the tank, empty, is sixteen tons.

Safety Carboy Rocker

A new safety carboy rocker for handling chemicals has been developed by the Mossberg Pressed Steel Corporation, Attleboro, Mass. The rocker is made of angle iron, welded at all joints. It is so designed as to make it simple for the operator to place the carboy, in its original case, firmly on the rocker, single handed. Pouring with the rocker is a simple and safe operation. Total weight, 18 pounds.

Laboratory Mixer

To meet the insistent demand for a more powerful, variable speed, low priced, non-sparking laboratory stirrer, the Lab-Mix Sr. has been evolved by the Chemical Publishing Company of New York, 175 Fifth Ave., New York. It is useful for making emulsions, dissolving dyes, gums and resins, waxes and bitumens, pyroxylin, cellulose ethers, casein, glue, gelatin, starch, salts; extracting crude drugs and herbs, oil seeds, complex organic materials, etc.

Actuated by a shaded pole type motor, it will run 24 hours daily, it is claimed, without damage. It can be used only on 110 volts (50-60 cycle) A. C. Since it is non-sparking, there is no danger of explosion when mixing inflammable liquids, such as alcohol, benzol, etc. The speed may be varied by the rheostat. There is an off position on the rheostat which serves as an on and off switch.

It is provided with a screw clamp which fits any ring stand. The shaft and propeller are made of Monel. The pitch of the propeller may be changed with pliers to regulate mixing. A flexible, 6 foot cord and plug are included so that it may be plugged into any outlet.

New Catalogs

Tantalum. A 48-page book of up-to-date authoritative information about this rare metal and its applications. Fansteel Metallurgical Corporation, North Chicago, Ill. (534)

Comparative Metal Melting Costs. A reprint of an article which appeared in **Metal Industry** in 1933, comparing melting by crucible pit, indirect electric arc, vertical ring induction, and open flame furnace. Campbell-Hausfeld Company, Harrison, Ohio. (535)

Kote-Rax. A synthetic rubber-like material for protecting plating racks. Hanson-Van Winkle-Munning Company, Matawan, N. J. (536)

Rubidium. A new rare metal for the industrial world. Fansteel Metallurgical Corporation, North Chicago, Ill. (537)

Haynes Stellited Valves. Increased life and economy resulting from the application of Haynes Stellite to valve seats. Haynes Stellite Company, Kokomo, Ind. (538)

Proof of Efficient, Economical Sand Cutting, as told by the users of the American Sand Cutting Machine. American Foundry Equipment Company, 408 Byrkit Street, Mishawaka, Ind. (539)

Microscope Illuminators, for routine and research. Bausch and Lomb Optical Company, Rochester, N. Y. (540)

Save-Lite Catalog. A factual presentation of painting as a part of lighting and plant conditioning. Sherwin-Williams Company, Dept. IMW-10, Cleveland, Ohio. (541)

Relays, Timing Devices, Thermostats, Pots and Ladles, Resistors, Thermal Links, Insulators, etc. Struthers Dunn, Inc., 139 N. Juniper Street, Philadelphia, Pa. (542)

Electrical Tachometers; indicating and recording. Bulletin 935. Esterline-Angus Company, Indianapolis, Ind. (543)

Wicaco Metering Fuel Oil Pump, permitting the use of 3c fuel. Wicaco Machine Corporation, Stenton Avenue and Louden Street, Philadelphia, Pa. (544)

Why Penalize the Performance of the Modern Car with an Undersized Battery? National Battery Manufacturers Association, Inc., 7 E. 44th Street, New York. (545)

Type "CH" All Metal Cloth Screen Dust Collector. Pangborn Corporation, Hagerstown, Md. (546)

The 92 Elements; their names, atomic numbers, symbols, atomic weights, melting points and years of discovery. St. John X-Ray Service Corporation, 505 Fifth Avenue, New York. (547)

Laboratory Apparatus Heated Electrically. Harold E. Trent Company, 618 N. 54th Street, Philadelphia, Pa. (548)

Apparatus for Testing Petroleum Products. Precision Scientific Company, 1749 N. Springfield Avenue, Chicago, Ill. (549)

Monarch Direct Length Reading Dials, for use on lathes. Monarch Machine Tool Company, Sidney, Ohio. (550)

Duplex Compressors, equipped with a channel valve. Ingersoll-Rand, 11 Broadway, New York. (551)

Sprayed Molten Metal Coating Process. Metals Coating Company of America, 495-497 N. Third Street, Philadelphia, Pa. File Folder No. 1203, 4 pages, entitled "MetaLayeR, The Process and Equipment," describes the complete Molten Metal Spraying System and advantages to users of Hi-Cap MetaLayeR. File Folder No. 1204, 4 pages, entitled "MetaLayeR, Complete Operating Equipment," describes in detail and illustrates Hi-Cap MetaLayeR, Hi-Cap MetaLayeR Control, Complete Hi-Cap MetaLayeR Blast Cleaning Equipment, Mass Coating Machines and Accessories. (552)

Worthington Internal Sleeve Bearing Double Helical Rotary Pumps. Type GS. Worthington Pump and Machinery Corporation, Harrison, N. J. (553)

Worthington Internal Roller Bearing Double Helical Rotary Pumps. Type GR. Worthington Pump and Machinery Corporation, Harrison, N. J. (554)

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

METAL INDUSTRY
116 John Street, New York.

(Insert below the number in parentheses at end of each item desired.)

I wish to receive the following catalogs mentioned in February, 1936

.....

.....

Name .....**Address** .....

Worthington External Ball Bearing Double Helical Rotary Pumps. Type GE. Worthington Pump and Machinery Corporation, Harrison, N. J. (555)

Brass and Other Copper Alloy Wire and Wire Products. Copper Development Association, Thames House, Millbank, London, S. W. 1, England. (556)

Wolverine Airless Injection-Four-Cycle Diesel Engines. Stationary type. Series B-T. Wolverine Motor Works, Inc., Bridgeport, Conn. (557)

Venn-Severin Oil Engines. Type D, Model M. Bulletin 450. Venn-Severin Machine Company, Chicago, Ill. (558)

Babcock and Wilcox Condensed Catalog. Bulletin G 2 A. Babcock and Wilcox Company, 85 Liberty Street, New York. (559)

Heater; for heating the inrush of cold air at large door openings, as in shipping and receiving departments.

Bulletin (D-1), issued by L. J. Wing Manufacturing Company, 14th Street and 7th Ave., New York City. (560)

Associations and Societies

Institute of Metals Division

29 W. 39th Street, New York

The Winter Meeting for 1936 will be held together with the 145th meeting of the A.I.M.E. at 29 W. 39th Street, New York, Feb. 17-21.

Special Features

Institute Excursion.—An all-day excursion to Schenectady, N. Y., for members, their families and friends, where they will be the guests of the General Electric Company, is being arranged for Friday, Feb. 21. A special train will transport the party directly to the plant and back.

Bermuda Cruise.—Once more following the Annual Meeting the cruise to Bermuda is available to members. The party sails from New York by the "Queen of Bermuda" at 6 p. m., Feb. 20, and returns to New York Feb. 28. For special rates and other details write **John T. Breunich,** 29 West 39th St., New York, N. Y.

Entertainment

Dinner-Smoker.—The Dinner-Smoker will be held in the Grand Ballroom of the Commodore Hotel Monday evening. Tables of ten will be reserved on receipt of $25.00. Single tickets are $2.50 each, the same as last year.

Luncheons.—Informal general luncheons will be served on the fifth floor on Monday, Tuesday and Wednesday, for which the usual charge will be made in part payment of the cost. Tickets should be obtained in the Lobby while registering.

Informal Dance. — The Informal Dance will be held Tuesday evening, Feb. 18.

Special Luncheon has been scheduled for the Executive Committee of the Institute of Metals Division, Thursday.

Special Dinner of the Institute of Metals Division, at which **Dr. Francis C. Frary** will be the principal speaker, will be at the Commodore Thursday evening.

Role of Metals in New Transportation.—A symposium arranged for Thursday morning and afternoon (to 4 p. m.) for the joint participation of the Iron and Steel and Institute of Metals Divisions. **A. J. Pelley,** president, Association of American Railroads, will deliver the keynote address at the morning session. That ideas in transportation are more abruptly changing at this time than at any time within our memory is self-evident. Speed seems to be the principal demand—on land, on water, or in the air. **C. H. Mathewson,** representing the non-ferrous field, will discuss the copper and nickel-base materials. **Zay Jeffries** will present a paper on **"Light-weight Metals in the Transportation Industry."** Leading authorities will discuss the whole subject on the symposium but in each case from a specific angle. **Paul D. Merica** and **Bradley S. Stoughton** will each preside over a session.

Institute of Metals Division.—Sunday, Feb. 23, 1936, will be the fiftieth anniversary of the first production of metallic aluminum by **Charles M. Hall,** by the electrolysis of aluminum oxide in a fused cryolite bath: which has suggested the dominant theme of the Institute of Metals Division program. **Dr. Francis C. Frary** will be the principal speaker at the dinner on Thursday evening, his subject, **"Fifty Years Progress in Aluminum."** Then there will be an Aluminum session Wednesday morning, with papers by **W. L. Fink** and **L. A. Willey,** by **H. R. Freche; L. W. Kempf** and **H. L. Hopkins,** and **F. Keller** and **C. M. Craighead.** And, for that afternoon, there are two papers on aluminum-alloy subjects by **W. L. Fink** and **D. W. Smith,** and **A. M. Talbot** and **J. T. Norton,** respectively. **C. G. Maier** will conclude this session with a paper on the theory of metallic crystal aggregates.

An attractive item listed for the Division's initial session (metallography) on Tuesday afternoon, is the paper, **"Microscopic Study of Ancient Bronze and Copper";** authors, **Colin G. Fink** and **E. P. Polushkin.** At 4 o'clock, Wednesday, **Robert F. Mehl** will lecture on **"Diffusion in Solid Metals."** Thursday morning and afternoon (to 4 p. m.) are reserved for the symposium on **"The Role of Metals in New Transportation."** The Executive Committee meets at luncheon Thursday noon. The A.I.M.E. excursion to the plant of the General Electric Company is on Friday.

National Metal Congress

Headquarters, 7016 Euclid Ave., Cleveland, Ohio

The 1936 National Metal Congress and Exposition, to be held in Cleveland's Public Auditorium, will be staged October 19th to 23rd, inclusive. This was announced definitely by W. H. Eisenman, managing director of the Exposition and national secretary of the American Society for Metals, which annually sponsors this event.

"This gives Cleveland one of the year's largest industrial shows," Mr. Eisenman said. "Thirty-five thousand engineers, metallurgists and practical men in the metal industry visited last year's Exposition which included the latest developments in metals and their use. Two hundred exhibitors used 175,000 square feet of floor space to exhibit their products."

Five great technical societies cooperate to stage this annual event. They are the American Welding Society, the Wire Association, the Institute of Metals and Iron and Steel divisions of the American Institute of Mining and Metallurgical Engineers, and the American Society for Metals.

The annual conventions of these Societies will be held at this time and will attract a large proportion of the total membership which is close to 20,000.

Foundrymen's Association

222 W. Adams St., Chicago, Ill.

With a view to making more effective the work the American Foundrymen's Association has carried on for a number of years, on plant safety, good housekeeping, and protection of foundry workers, a Safety and Hygiene Section has been organized to accomplish the following purposes:

To determine further the extent of hazards to safety and health in the foundry industry; to study causes of hazards and methods of prevention, and to provide further protection to workers against exposure.

Cooperation with other centralized agencies of industry confronted by similar problems, in assembling and making available information on this subject.

Cooperation with public health agencies, insurance carriers, and the medical profession in forwarding health measures.

Assisting in standardization of dust elimination equipment and improvement of shop operating conditions in the foundry industry through active educational work.

Promoting standards for dust elimination and control equipment, in cooperation with agencies of the manufacturers of such equipment.

Giving encouragement by active means where enactment of equitable and

fair compensation laws is sought in industrial states.

E. O. Jones, for many years associated with Belle City Malleable Iron and Racine Steel Casting Companies, Racine, Wis., and for the past three years Consultant of Industrial Relations Bureau of the National Founders Association, has been made Director of Safety and Hygiene section, and will have his office at the headquarters of the American Foundrymen's Association, 222 West Adams Street, Chicago.

The Association is inviting the cooperation of all those interested in industrial safety and hygiene and advises that it has available for those who desire them, copies of a 30-page pamphlet reporting the session on "Good Housekeeping" of the 1933 Chicago convention. Also available for distribution are copies of a 64-page report of papers on "Dust Control and Employer Responsibility" presented at the 1935 convention held at Toronto, Canada.

Nomination of Officers and Directors

At a meeting of the Nominating Committee of the American Foundrymen's Association, in Cleveland, January 13, **James L. Wick, Jr.,** president and general manager, Falcon Bronze Company, Youngstown, Ohio, was nominated for president of the Association for the years 1936-37. Mr. Wick at present is vice president of the Association and has long been active in its work. His particular interest has been in cost work and he headed this A.F.A. committee for many years. It was the work of his committee that led to the standardization of cost systems within the various branches of the Foundry Industry.

In addition to Mr. Wick, the following members were nominated as officers and directors:

For Vice President, H. Bornstein, Chief Chemist and Metallurgist, Deere & Co., Moline, Ill.

For Directors to Serve for Three Years:

Marshal Post, vice president, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

L. N. Shannon, vice president and production manager, Stockham Pipe & Fittings Co., Birmingham, Ala.

James R. Allan, assistant manager, Industrial Engineering and Construction Dept., International Harvester Co., Chicago, Ill.

C. C. Gibbs, president, National Malleable & Steel Castings Co., Cleveland, O.

Dan M. Avey, editor, "The Foundry," Cleveland, O.

Mr. Avey is now president of A.F.A. and will retire on the election of a successor after serving two successive terms.

The American Foundrymen's Association is pleased to announce the election of its European representative, **Vincent Delport,** director and manager, Penton Publishing Co., Ltd., Caxton House, London, England, as vice chairman of the International Committee of Foundry Technical Associations. This is the organization which controls and schedules International Foundry Congresses, the next of which is scheduled for Dusseldorf, Germany, September 15 to 20, 1936. Membership of the International Committee is composed of representatives of the foundry technical associations of the United States, Great Britain, France, Czechoslovakia, Germany, Holland, Italy, Poland and Spain. Mr. Delport has been A.F.A. representative on this committee for several years and this honor comes to him after distinguished services at various International Congresses.

Philadelphia Chapter, A.F.A.

1315 Spruce Street, Philadelphia, Pa.

The Philadelphia Chapter of the American Foundrymen's Association will hear a discussion of modern non-ferrous foundry practice by D. M. Curry of the International Nickel Company, 67 Wall Street, New York, at its February 7th meeting. This will include a survey of the most recent methods of casting non-ferrous alloys, with emphasis on the nickel bronzes and nickel silvers. Considerable attention will be given to molding sand control which is considered by Mr. Curry a highly important factor in foundry work. The talk will be presented in a practical style and the foundrymen attending will have ample opportunity to have their questions answered. It will be well illustrated by slides.

The meeting will be held in the Engineers Club, 1315 Spruce Street, at 8 P. M. and will be preceded by a dinner at 6.

Society for Testing Materials

260 South Broad Street, Philadelphia, Pa.

The following is schedule of meetings for 1936:

Regional Meeting, Wednesday, March 4, Hotel William Penn, Pittsburgh, Pa.

Group Meetings of A.S.T.M. Committees, Monday, March 2 through Friday, March 6, Hotel William Penn, Pittsburgh, Pa.

Thirty-Ninth A.S.T.M. Annual Meeting, June 29-July 3, Chalfonte-Haddon Hall, Atlantic City.

At the regional meeting a Symposium on High-Strength Constructional Metals will be held. This comprises five papers dealing with alloys of copper, aluminum and magnesium alloys, nickel and its alloys, carbon and low-alloy steels and corrosion-resisting steels.

The A.S.T.M. committee listed below will hold meetings at the Hotel William Penn, Pittsburgh, during A.S.T.M. Committee Week, March 2-6, and a number of other committees are expected to participate. Many subgroups of these main committees will also hold meetings and it is estimated close to 100 meetings will be held during the week.

Coordinating Committee on Non-Ferrous Metals and Alloys.

B-5 on Copper and Copper Alloys.

E-4 on Metallography.

Joint Committee on Exposure Tests of Plating on the Non-Ferrous Metals.

Research Committee on Fatigue of Metals.

Symposium on Constructional Metals

On the recommendation of the Pittsburgh A.S.T.M. District Committee, the technical features of the Society's Regional Meeting to be held on Wednesday, March sixth is to be a Symposium on High - Strength Constructional Metals. In addition to Dean Harvey, Materials Engineer, Westinghouse Electric and Manufacturing Company, E. Pittsburgh, Pa., who is chairman of the Pittsburgh District Committee and Jerome Strauss, Vice-President in charge of Research and Development, Vanadium Corporation of America, Bridgeville, Pa., who is chairman of the program committee, the following are assisting:

F. H. Frankland, Technical Director, American Institute of Steel Construction, 200 Madison Avenue, New York; R. A. Wilkins, Vice-President, Revere Copper and Brass, Inc., New York Central Bldg., New York; E. H. Dix, Jr., Chief Metallurgist, Aluminum Research Laboratories, Aluminum Company of America, New Kensington, Pa.

It is planned that the symposium will be held in two sessions, on the morning and afternoon of Wednesday, March 4. One of these sessions will be devoted to papers on non-ferrous metals and the other on steels. The Program Committee has indicated its intention to consider metals and alloys chiefly employed for such constructional applications as buildings, bridges, ships, automobile and railway car bodies, airplane wings, tanks and the like.

A list of the non-ferrous papers to be presented, and their authors, follows:

Alloys of Copper—H. A. Bedworth, Superintendent of Service Engineering, The American Brass Co.; **Aluminum and Magnesium Alloys—E. H. Dix, Jr.,** Chief Metallurgist, Aluminum Research Laboratories, Aluminum Company of America; **Nickel and Its Alloys—A. J. Wadhams,** The International Nickel Co.

American Electro-Platers' Society

c/o E. Steen Thompson, 905 W. 10th Street, Erie, Pa.

The date for the annual convention to be held in Cleveland, has been changed because it conflicted with the convention of the Republican Party which will also be held in Cleveland.

The new date for the 1936 convention of the Society is June 1-4 inclusive.

Bridgeport Branch A.E.S.

c/o Chas. H. Costello, 1285 Boulevard, New Haven, Conn.

The Bridgeport Branch of the American Electro-Platers' Society will hold its Annual Banquet and Educational Session at the Stratfield Hotel, Saturday, March 14, 1936, tickets $3.00.

alter Meyer, in charge of the Educational program has arranged for a very interesting afternoon session. The papers to be read should interest the attending members. Among the speakers will be: **Dr. R. R. Rogers,** Columbia University, Department of Chemical Engineering, who will read a paper on Chrome. **W. M. Phillips,** General Motors Company, will show the Pictorial Projectoscope, showing plating solution at work on the screen.

The banquet will start at 7 P. M. The Banquet Committee has planned a first class affair, good entertainment, dancing and music by a high class orchestra. All to be had in the main ballroom. Tickets may be obtained in advance from C. H. Costello, 1285 Boulevard, New Haven, Conn.

New York Branch, A.E.S.

c/o F. J. MacStoker, 25 Princeton Street, Garden City, L. I., N. Y.

The New York Branch of the American Electro-Platers' Society held two scheduled meetings during January at which two special subjects of avowed interest were treated by distinguished lecturers of the electro-chemical fraternity.

On Friday, January 10th, Dr. Alpern of Brooklyn College, Brooklyn, N. Y., presented for the interest of the membership facts of the development to date of a complex ion solution using iodine as a substitute for the cyanides in gold and silver solutions. The subject matter of this discourse being substantially new it created a great interest and much questioning on the part of the membership after the course of the lecture. Dr. Alpern is to be congratulated on his ability to put his subject before the plater in an understandable manner.

On Friday, January 24th, the Branch had the opportunity of listening to one of the most completely interesting illustrated lectures ever given at New York Branch by one of the distinguished members of the American Electro-Platers' Society and authority in the electroplating field, Mr. George Hogaboom of the Hanson-Van Winkle-Munning Company. His subject was his well known one "What is under the Plate." Mr. Hogaboom showed conclusively the reasons for much of the dissatisfaction with plated finishes did not rest with the plater but rather were metallurgical problems. The membership extended Mr. Hogaboom a rising vote of thanks for his splendid effort.

Waste Material Dealers

Times Building, New York

Announcement is made by E. J. Keller, Chairman of the Banquet Committee for the Twenty-third Annual Banquet of the National Association of Waste Material Dealers, Inc., that even at the present early date indications are that the Association's Banquet this year, which is to be held on the evening of March 18th, will be the largest affair of its kind ever held by the Association.

The Twenty-third Annual Banquet will be held in the Grand Ballroom of the Hotel Astor and the Committee in charge is making preparations which will make the Banquet this year rank second to none of the many successful Banquets held by the Association during the past twenty-three years.

Milwaukee Branch, A.E.S.

c/o Frank J. Marx, 1431 W. Cherry St., Milwaukee, Wis.

On Saturday evening, March 21st at 7:30 P. M. Milwaukee Branch, American Electro-Platers' Society will hold their Annual Educational Meeting and Smoker at the Hotel Schroeder (Green Room) corner of Fifth St. and Wisconsin Ave. to which you are cordially invited.

The committee has arranged a fine educational meeting. Three nationally known speakers will present papers on the latest developments in the electroplating field. The program will be announced later.

The educational meeting will be followed by a Buffet Lunch and refreshments for which the Milwaukee Branch is famous. A high class entertainment will close the session.

A small fee of $2.00 will cover all expenses.

Mid-West Job Platers Association

7320 Hamilton Avenue, Detroit, Mich.

The next general meeting of the Master Electro-Platers' Institute of the Mid-West, will be held in Toledo, Ohio, March 28-29. The Committee on Arrangements is headed by Messrs. Hale and Hilfinger.

Foundry Equipment Manufacturers

Arthur J. Tuscany, Executive Secretary of the Foundry Equipment Manufacturers Association, Cleveland, Ohio, announces that the annual meeting of the organization will be held at the Cleveland Hotel, Cleveland, Ohio, on Saturday, February 8, 1936.

In addition to handling routine matters such as reports of officers, election of three directors to fill expired terms, there is to be considered such subjects as plans in connection with the forthcoming exhibit of Foundry Equipment to be held at Detroit in May, 1936, during the annual meeting of the American Foundrymen's Association; plans for a broadened activity of the association occasioned by a greatly increasing demand for Foundry Equipment, bringing with it increasing responsibilities on the part of the equipment manufacturers.

Electrochemical Society

Columbia University, New York

The Cincinnati meeting of the Electrochemical Society will be held at the Hotel Netherland Plaza, April 23-25. One of the features of this meeting will be a session on Electrodeposition and Batteries. Another session will be devoted to Inhibitors.

Jewelers Board of Trade

Turks Head Building, Providence, R. I.

The annual meeting of the members of the Manufacturing Jewelers Board of Trade, now using the style of the Jewelers Board of Trade, was held on Friday, January 24, 1936, at 4:00 o'clock, P. M. at the Turks Head Club, Providence, R. I.

Alfred K. Potter, acting president, presided and made an interesting address.

The reports of H. M. Peck, secretary and treasurer, were submitted. Eleven new directors were elected.

Exhibitors Advisory Council

330 W. 42nd Street, New York

At the annual meeting of the Board of Directors of the Exhibitors Advisory Council, Inc., the following officers were elected to serve in 1936.

President, N. O. Wynkoop, McGraw-Hill Publishing Company, New York; **Vice-President, E. J. Billings,** Babcock and Wilcox Company, New York; **Secretary, C. E. Sullivan,** The Foxboro Company, Foxboro, Mass.; **Treasurer, R. H. DeMott,** SKF Industries, Inc., Philadelphia, Pa.; **Executive Secretary, W. A. Hemming,** Exhibitors Advisory Council Inc.

The Exhibitors Advisory Council has, since 1926, assisted exhibitors of trade, industrial and related shows and expositions, by issuing comprehensive data and information on all types of shows. Considerable research is conducted in the interests of improving conditions relating to shows and exhibits.

Personals

Dr. E. R. Weidlein

The Chemical Industry Medal for 1935 was presented November 8, 1935, to Dr. Edward R. Weidlein, Director of Mellon Institute of Industrial Research, Pittsburgh, Pa., at a meeting of the American Section of the Society of Chemical Industry, held at The Chemists' Club, New York City. The meeting was held jointly with the American Chemical Society. Dr. L. V. Redman first gave a short talk outlining the accomplishments of Dr. Weidlein that had merited this award. The presentation was then made by Dr. D. D. Jackson of Columbia University.

Dr. Weidlein has since been elected president of the American Chemical Society for 1937.

Dr. Weidlein was born in Augusta, Kansas, July 14, 1887. He was graduated from the University of Kansas in

1909, and received the master of arts degree in 1910. He was industrial fellow of the University from 1909 to 1912. He holds the honorary degree of doctor of science from Tufts College, 1924, and of doctor of laws from the University of Pittsburgh, 1930.

Dr. Weidlein became associate director of the Mellon Institute in 1916, after serving four years as senior industrial fellow. In 1921 he was named director. His research has been chiefly in the fields of heat insulation materials, hydrometallurgy, camphor, and epinephrine. Recently he has devoted himself to industrial research methodology.

Dr. Weidlein was chairman of the fuel committee of the National Research

Dr. Edward R. Weidlein

Council in 1918, and is now a member of the Council's central petroleum committee and of its division of engineering industrial research. He was a chemical expert to the War Industries Board, 1918-1919.

He is a past president and director of the American Institute of Chemical Engineers, and a fellow of the American Association for the Advancement of Science and the American Institute of Chemists. He is a member of the Society of Chemical Industry, the Electrochemical Society, the Franklin Institute, the American Institute of Mining and Metallurgical Engineers, and the Faraday Society, as well as of numerous other organizations in this country and abroad. He is a trustee of the University of Pittsburgh, and a director of the Forbes National Bank, Pittsburgh.

F. K. Taylor, vice-president in charge of industrial sales, Taylor Instrument Companies, Rochester, N. Y., is now on a several weeks' visit to the southwest and Pacific coast offices.

Jesse R. Harlan was recently appointed sales promotion manager of the Yale and Towne Manufacturing Company, in their Philadelphia, Pa. office.

Announcement is made of the 25th wedding anniversary celebration of **Mr. and Mrs. Louis Epner;** also the fact that Mr. Epner is in his 25th year of service with the plating firm of **Cohan-Epner Company, Inc.,** 122 Centre Street, New York. A dinner was given in honor of Mr. and Mrs. Epner in the Candlelight Room of the Fourteen East 60th Street Hotel on February first.

The firm of Cohan-Epner began operations in the Fall of 1911 employing four men. To-day this firm operates one of the large job plating plants of New York. They do a general plating business, but the major part of their work is in gold and silver plating and galvano, in which they are a leader. **Mr. Epner** is in charge of sales and contacts with customers. **Mr. Cohan** is in charge of the plant operations. The firm has grown steadily and now employs forty to fifty men. They enjoy an excellent reputation for high-grade work.

Dr. Norman A. Shepard has been appointed director of technical service for the **American Cyanamid Company,** the **American Cyanamid and Chemical Corporation** and other companies in the Cyanamid group where co-operation in this field is required. He will direct technical service laboratories located in Stamford, Conn.

Obituaries

Daniel Kelly

Daniel Kelly, retired superintendent of the American Brass Company mills at Torrington, Conn., died recently at his home in North Pelham, N. Y. He was 76 years old. A daughter and five sons survive.

Albert F. Shore

Albert F. Shore, 50 W. 86th Street, New York, inventor and metallurgical engineer, died January 17, 1936, in the Wickersham Hospital at the age of 59, of a stroke.

Mr. Shore, who had received the Elliott-Cresson Medal from the Franklin Institute of Philadelphia, was president of the Shore Instrument and Manufacturing Company, Jamaica, L. I. Of many metallurgical testing instruments he invented, the best known is the scleroscope, for determining the hardness of metals. It has been used in many countries since 1907. He also invented the Monotron for testing any known material.

Mr. Shore belonged to the American Society for Testing Materials and had contributed to its meetings many monographs on the physical properties of metals. He is survived by three sisters and four brothers.

John W. Pilling

John W. Pilling, 74 years old, founder, president and treasurer of the Pilling Brass Company, Waterbury, Conn., and later president and treasurer of the Baltimore Brass Company, died recently at the Johns Hopkins Hospital, Baltimore. Mr. Pilling for the last fifteen years had lived in Baltimore where he directed the operations of his company there.

Mr. Pilling was born in Franklin, N. J., July 17, 1861, the son of William and Isabella Fleming Pilling. His youth was spent in Westerly, R. I., but he went to Waterbury when 17 years old. He followed the carpenter's trade for a decade. He was associated with the Scovill Manufacturing Company for two years, when he went with the Aluminum Brass and Bronze Company of Bridgeport, where he stayed for a year. He returned to Waterbury and went to work in the old Benedict and Burnham brass mill. He worked his way upward becoming foreman.

In 1907 he organized the Pilling Brass Company in a plant on Lafayette Street, Brooklyn, N. Y. With him in the enterprise were the late James H. Pilling, Truman Lewis and Jacob Sweiger. John Pilling was president and treasurer and Mr. Sweiger, secretary. Two years later, Mr. Lewis and Mr. Sweiger sold their interest in the business, and James Pilling became secretary. John Pilling retained the two offices he held at its founding and the business was later moved to 482 Watertown Avenue, this site being taken over in 1913.

Mr. Pilling married Miss Rose Emily Boden of Arden, N. Y., in 1887. The couple had four children, Norman B., graduate of Yale, Marion, Margaret and John Pilling.

Henry F. Juergens

Henry F. Juergens, jewelry manufacturer and a resident of Edgewood, R. I., for the past fifteen years, died on January 11 at his home, 1684 Broad Street, after a lingering illness. Mr. Juergens operated the Juergens Jewelry Company, 150 Chestnut Street, Providence, and in 1917 established the first jewelry plant in Mexico City.

Born in Schakopee, Minn., December 25, 1864, Mr. Juergens went to New York and in 1893 started manufacturing unique export jewelry known as the gold wire and roll plate type. He was in business in New York until 1920.

He is survived by his widow, Mrs. Mary Cawley Juergens; three sisters and one nephew.

Charles O. Patch

Charles O. Patch, formerly a member of the board of directors of the Michigan Smelting and Refining Co., Detroit, died early in January at his home in Pasadena, Calif. He had been in poor health for some time. Mr Patch came to Detroit in 1909 to assume duties with the Security Trust Co. He left that post in 1915 to become affiliated with the smelting company and continued with it until illness forced his retirement several years ago. Surviving are his widow Mary G. Patch, and one son, Charles Patch, of Cleveland.

—F. J. H.

J. W. Millard

Funeral services for J. W. Millard were held January 25th in his home in Hamilton, Ont., Canada, following his death at the age of 80 years. Mr. Millard became associated with the International Silver Company of Canada in 1881, advancing through various ranks to assume the presidency which position he held for many years. He retired in 1930.

Mr. Millard was regarded as an authority on the mining and distribution of silver and other metals. The widow, a son and a daughter survive.

Edward S. Christiansen

Edward S. Christiansen, National Smelting Company, Cleveland, Ohio, died on December 26th.

Industrial and Financial News

Metal Developments

According to a report in the daily press, the brass industry seems to have been involved in the munitions investigation recently held by a committee of the Senate. **W. A. Morgan,** retired financier was president of the **Buffalo Copper and Brass Company** at the beginning of the war. At that time it was one of the smallest mills of its type in the United States. Mr. Morgan, along with a number of others bid for a contract on 10,000,000 pounds of brass to be completed in 90 days. He bid 30 cents a pound, and the bid was accepted. A few days later he was called to New York by the banking house of **J. P. Morgan** and was told that they had been advised that he did not even have a mill. Mr. Morgan of Buffalo convinced the New York Morgans that he did have a mill and that he would live up to his contract. The order was not cancelled and the contract was fulfilled.

The **School of Technology** of the **College of the City of New York** held an Open House reception, and dance on February 1st. Visitors were invited to inspect the engineering buildings, laboratory and equipment, after which the dance was held in the main gymnasium.

Lost time accidents at the **AC Spark Plug Company** decreased from 77 in 1934 to 26 in 1935. This accomplishment places the AC company well toward the top of the safety list in American industry.

On November 19, the officials of the **Chase Companies, Inc.,** Waterbury, Conn., parent company of the **Noera Manufacturing Company,** winner of a bronze plaque in the Metals Section Safety Contest for the year 1934-1935, gave a dinner to the employees of the Noera company, at which time the formal presentation of the plaque was made. The Noera company has completed a period of five years without a lost time accident.

All world's records for the production of aluminum were broken by the foundries of the **Bohn Aluminum and Brass Corporation,** Detroit, Mich., which produced over 40,000,000 pounds of aluminum castings during 1935. This gives Detroit the biggest aluminum foundry in the world. The **Michigan Smelting and Refining Company,** which is a **Bohn** subsidiary, increased their sales of non-ferrous ingots in 1935 by approximately 70 per cent.

Financial statistics are few this month but those which have been reported are on the encouraging side. Orders received by the **General Electric Company** during 1935 amounted to $217,361,587 compared with $183,660,303 during 1934. Orders for the quarter ended December 31 amounted to over $58,000,000 compared with about $51,000,000 for the same quarter of 1934. **Parker Rust Proof Company** and **Metal Finishing Research Corporation** of Detroit, showed a net profit of $952,819 compared with $691,067 in 1934. **Revere Copper and Brass, Inc.,** reported a net income of $436,288 for the first nine months of 1935 compared with $989,817 for the same period of 1934; **Mueller Brass Company,** $404,738 against $131,798.

The **Chase Companies,** Waterbury, Conn., are erecting the first all-copper house to be built in Connecticut, the second for the United States. The plans were drawn by Copper Houses, Inc., a subsidiary of the Chase Companies. A description of one of these houses was published in **Metal Industry** for October, 1935.

General Houses, Inc., 220 S. State Street, Chicago, Ill., have announced a new type of pre-fabricated dwelling, a steel panel house. The frame is of copper bearing steel columns and beams. The exterior walls use built-in aluminum foil insulation.

Republic Steel Corporation will spend nearly $1,200,000 for immediate improvement in more than a dozen of its plants. One project in Warren, Ohio, plant is additional finishing equipment to be installed to increase tin plate production.

Government Asks for Bids on Metal Products

Bids on a variety of metal products are being asked by various departments of the Federal Government.

Chemical Warfare Service, Edgewood Arsenal, Md., copper angle tubes; bids in by February 13.

Salvage Officer, Rock Island Arsenal, Ill., will sell brass scrap, aluminum scrap, etc.; bids in by February 14.

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., pig tin; bids in by February 17.

Chief Resettlement Purchase Sec., Treasury Department, Washington, D. C., pig lead.

Conklin Co. 75 Years Old

The **T. E. Conklin Brass & Copper Company, Inc.,** independent distributors and warehousers of copper, brass and bronze products in the metropolitan district of New York, are this year celebrating their diamond jubilee, the company having been founded in 1860.

The business was originally established by **Jacob Hoppeck,** with an office on John Street and a rolling mill at Twenty-second Street and Second Avenue, New York City, and in about 1860 was sold to the firm of **Holmes, Griggs & Smith,** located at Duane and Elm Streets. In the early seventies, due to changing business conditions, the title of the concern was changed to the **Holmes & Griggs Manufacturing Company.** Brought into prominence by the repute of the established concern of **Holmes, Booth & Hayden,** the family name of **Holmes** was a prominent and significant one in the brass industry at that time.

Subsequently the **Holmes & Griggs** rolling mill was moved to Twenty-fourth Street and Eleventh Avenue, and in 1881, the partnership was dissolved, **Mr. Holmes** retaining the mill and **Mr. Griggs** remaining at Duane Street as a distributor and middleman.

In 1901 **T. E. Conklin,** who had been with **Mr. Griggs** for twenty-eight years, succeeded to the business, **Arthur E. Colley** becoming associated with him as a partner in 1903.

In 1922 expansion of the company's volume of business made it necessary to secure more space for increasing stock requirements and the office of the company was moved around the corner to 113-115 Leonard Street.

The company now announces that office space directly above the present warehouse at 54-60 Lafayette Street had been leased for a term of years and on or about January 20th the offices of the company will be moved back to that address. The company will then occupy three entire floors with a total area of 30,000 square feet.

Officers of the company today are, **William B. Brown,** President; **Theo. B. Conklin,** Vice President; **Harold S. Conklin,** Treasurer and **William E.**

Conklin, Secretary. Mr. Brown, on January 2nd, celebrated his 35th year with the company. The other officers are all sons of **T. E. Conklin. Charles Bauer,** former Secretary and General Manager, who was widely known and respected in the trade, and who passed away March 25, 1935, was with the company for 49 years. (See **Metal Industry** for April, 1935).

Business Items-Verified

Beryllium Products Corporation, of New York, Reading, Pa., is moving into the office of the former Temple Malleable Iron and Steel Company plant. The company will engage in the manufacture of beryllium alloys with copper, nickel and iron. This firm operates a casting shop.

Globe-Union Manufacturing Company, E. Keefe Avenue, Milwaukee, Wisc., manufacturer of storage batteries for automobiles, parts, etc., has let general contract for a one-story branch plant, about 20,000 sq. ft. floor space, on District Boulevard, Central Manufacturing District, Los Angeles. Cost close to $70,000 with equipment. Local offices are at 2149 Sacramento Street. The firm operates the following departments: tool room, stamping, plating, polishing.

The **Atlantic Brass and Copper Company,** 579 Broadway, New York City, has been organized, to handle anodes, buffs, copper wire, and will also act as mill representatives specializing in surplus lots of usable brass copper, nickel silver, Monel metal, aluminum and zinc. H. M. Schwartz is proprietor, who has been active in the metal manufacturing lines for the past 25 years, it is stated.

Latrobe Die and Casting Company, Latrobe, Pa., will be enlarged. A new building, 60 x 75 ft., is being erected. S. F. McElroy is manager. This firm operates the following departments: tool room, casting shop, polishing and grinding room.

Monarch Engineering and Manufacturing Company, Curtis Bay, Baltimore, Md., has been incorporated with 100,000 shares of stock at par value of $1 each, to deal in metallurgical furnaces and core ovens. Incorporators are Harry D. Harvey, John E. Weyer and H. Elmer Singewald, all of Baltimore.

Glauber Brass Manufacturing Company plant, Cleveland, is being moved to Kinsman, Ohio, where a brick, concrete and steel building, 90 x 200 ft. is being erected. The company will manufacture bathroom and kitchen sink fixtures, valves, brass pipe fittings and other supplies. Through the purchase of the Rickersberg Brass Company, the Glauber Company, has obtained patterns and equipment for manufacturing copper fittings as well as globe, gate and angle valves. These two lines have been added. The firm operates the following departments: foundry casting shop, brass machine shop, tool room, plating, polishing and grinding room.

Hickok-Matthews Company, silversmiths, has leased the first floor and basement in the building at 18 Crawford Street, Newark, N. J. The company is said to be one of the oldest silversmiths in Newark, and has been located on Prospect Street for a number of years. The move has been made as a result of expansion in business. The firm operates the following departments: tool room, etching department, spinning, stamping and polishing, silversmithing.

Good Manufacturing Company, Inc., formerly 303 E. 134th Street, Bronx, N. Y., manufacturers of plumbing specialties and accessories has acquired and moved into the four-story building 100 x 100, at Lincoln Avenue and E. 137th Street, N. Y. The building has been completely remodeled.

Hedstrom Union Company, East Templeton, Mass., manufacturers of pressed steel products, principally toys, will move to Fitchburg, Mass., where Mill C of the Parkhill Mills, has been leased. The firm operates the following departments: tool room, stamping, grinding room, japanning.

Salem Engineering Company of Canada, manufacturers of industrial heating furnaces, announces the acquisition of offices and manufacturing facilities at Welland, where they have located their business, which has heretofore had offices in Toronto. A. T. Greiner is resident manager.

Savannah Wire Weaving Company, Savannah, Ga., has been organized to operate a wire screen factory. Twenty Kintzing looms have been added. Julian Howell, Atlanta, and Arthur G. Corkery, Atlanta, will head the company. Two members of the Board of Directors are Major Clark Howell, Jr., vice-president and general manager of the Atlanta Constitution and Robert M. Nelson of New York and Savannah.

Trane Company, La Crosse, Wisc., manufacturer of steam and heating specialties, has leased about 20,000 sq. ft. floor space in building at King and Dufferin Streets, Toronto, for expansion in plant of Trane Company of Canada, Ltd., a subsidiary, 439 King Street, W., Toronto. Present works will be removed to new location and additional machinery installed. The following departments are operated: brass machine shop, tool room, cutting-up shop, stamping, soldering, brazing, plating, polishing, grinding room and lacquering.

Briggs and Stratton Corporation, Milwaukee, Wisc., manufacturer of automotive locks, and hardware, small gasoline engines, etc., have purchased former Westinghouse Lamp Company plant with 225,000 sq. ft. of floor space for additional capacity for heavy manufacturing, storage and shipping, continuing present plant. Occupancy was taken about February first. This firm operates the following departments: tool room, stamping, plating, polishing, and lacquering.

The **Buckingham Products Company,** 8900 Hubbell Avenue, Detroit, Mich., was recently organized to engage in the manufacture and sale of polishing and buffing composition. Mr. Buckingham reports that his company is now in full production and in position to take care of all requirements of polishing and buffing composition. Associated with Mr. Buckingham are P. A. Patterson, as secretary and J. R. Anstey as treasurer. All of the above were formerly connected with the McAleer Manufacturing Company, Detroit, Mich.

During the past few months **The American Foundry Equipment Company,** 408 Byrkit Street, Mishawaka, Indiana, have expanded their plant facilities and services for their customers. Modernization of the entire plant, the addition of a large building for assembly and shipping facilities and the improvement of their foundry, as well as the expansion of the entire organization and the employment of considerably more labor, were announced by Otto A. Pfaff, Vice-President and General Manager of the company.

The **Torrington Company,** Torrington, Connecticut, and its subsidiary, the **Bantam Ball Bearing Company,** South Bend, Indiana, announce the appointment of **A. S. Hellstrom** as manager of the Cleveland, Youngstown, Akron and Wheeling Districts with offices in the Caxton Building, Cleveland, Ohio. He will continue to handle the engineering sales and service of Bantam roll neck and heavy duty bearings, together with Torrington's line of smaller bearings and specialties.

W. W. Davidson, vice president and sales manager of **Detroit Rex Products Company,** 13006 Hillview Avenue, Detroit, Mich., has announced the opening of a new branch office at 201 N. Wells Street, Chicago, Ill., to cover the states of Wisc., Ill. and Mo. The representatives placed in charge of this territory are **G. P. Anstiss, S. B. Crooks** and **C. L. Jung. Frank P. Cox** has been placed in charge of alkali cleaners and strippers. Mr. Cox, from his headquarters in the Detroit office, will supervise the sale and service of alkali cleaners throughout the country. **George W. Walter,** formerly Editor of Metal

Cleaning and Finishing, has been appointed advertising manager for the company. During the past year, Detroit Rex Products Company, formerly known as Rex Products & Manufacturing Company, have increased their sales and engineering forces. They have also expanded their line of cleaning equipment and extended their service in the metal industries. This company produces Detrex degreasers and solvent machines, Triad and Perm-A-Clor non-inflammable solvents, and Triad Alkali cleaning compounds.

The Plating Products Company located at 352 Mulberry Street, Newark, New Jersey, have been recently appointed a distributor of the Abrasive Company, Philadelphia, Pa., manufacturers of Borolon and Electrolon Grinding Wheels. A representative line of grinding wheels will be carried in stock. In addition The Plating Products Company carry a complete stock of Borolon and Electrolon Polishing Grain in sizes ranging from 36 to FF.

International Selling Corporation, has moved to new quarters, 26-28 Beaver Street, New York. Increased business has made it necessary for them to obtain larger offices, the entire 15th floor at their new address.

Basca Manufacturing Company, 1454 E. 19th Street, Indianapolis, Ind., manufacturer of metal stampings, automobile mufflers, etc., has purchased former plant of **Houdaille-Hershey Corporation,** 3019 Roosevelt Avenue, manufacturer of automobile shock absorbers, totalling 100,000 sq. ft. floor space and will improve for new plant. Present works will be removed to new location and increased capacity carried out. **L. L. Swartz** is president. The following departments are operated: tool room, stamping.

DeVilbiss Company, Toledo, Ohio, has opened a training school for industrial painters, automobile refinishers and all others interested in learning the technique of spray-painting. The training period lasts for one week. Classes will start on the following dates: February 10, March 9, April 6, May 4 and June 8. Complete information can be obtained from the company.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

February 3, 1936.

An order for 350,000 sets of aluminum automobile marker plates has been given the **Scovill Manufacturing Company** by the Connecticut motor vehicle department. Heretofore, the plates have been of cheap metal and discarded each year. The new plates may be kept on the cars permanently, so long as the owner pays his yearly registration fee and does not have his license suspended, the only change each year being the insertion on one end of the plate of a tag showing the year. Heretofore the markers have been made at the state reformatory. Under the new plan, although Scovill will make the plates they will be stamped with the numbers at the reformatory. The motor vehicle department estimates that the cost will be about 30.3 cents each, of which 21 cents goes to Scovill's and the rest to the reformatory. The previous cost was 12.3 cents for plates discarded each year.

Judge Carroll C. Hincks of the U. S. District Court has postponed appointment of trustees to liquidate the **Beardsley & Wolcott Manufacturing Company,** although he previously ordered such liquidation. It is now believed that a reorganization may be effected and that the **Reconstruction Finance Corporation** will advance funds so that the business may be continued. The RFC has already taken an appeal to the Circuit Court from the District Court's order to liquidate. It already has an $80,000 mortgage on the plant. The city of Waterbury has agreed to compromise its claim for nearly $50,000 for taxes if the factory remains open but will press for payment in full if it is liquidated.

Reduction in the import tariff on Swiss watch movements, contained in the recent trade treaty will seriously injure the business of the **Benrus Company** here, but not seriously affect the **Waterbury Clock Company** and the **Lux Clock Company** officials say. **J. R. Sheldon,** president of the **Waterbury Clock Company,** says Switzerland will not be able to compete on a price basis with his concern. The treaty also provides for a reduction in the import duty of American typewriters but Hartford typewriter manufacturers say it will help them little as buying of typewriters in Switzerland is negligible.

The **Somers Brass Company** is increasing its capital from $50,000 to $100,000.

The **Scovill Manufacturing Company** will assume the tax of 2½ per cent payable to the state of Wisconsin on earnings of the company on business in that state instead of passing the tax on to the stockholders. The company owns the **Hamilton-Beach** plant in Racine which makes vacuum cleaners and other electrical household articles.

Local employers estimate that they will have to pay the U. S. Treasury for 1936 for their share of the Social Security Tax, about 5 million dollars. There will be additional expense of about $300,000 in setting up accounting systems to take care of the tax. **Francis T. Reeves,** secretary of the **Scovill Manufacturing Company,** estimates that Scovill's payment for 1936 will be $900,000 and an extra expense of $50,000 will result from extra bookkeeping.

About 20 employees of the plating room of the **Waterbury Buckle Company** walked out last month, claiming that certain other employees had been laid off and the work "stretched out" so that those remaining had to do it. They returned after a few days and it was explained that the trouble was merely due to a misunderstanding.

—W. R. B.

Connecticut Notes

February 3, 1936.

HARTFORD—There was a slight gain in the number of employees in Hartford county factories during December according to the report of the **County Manufacturers Association,** bringing the total to the largest figure since December, 1929. Employees in the 82 largest plants totaled 50,849, a gain of 181 over the previous month. Hartford City's total was 25,231, an increase of 35; Southington's 11,109, an increase of 19; New Britain, 14,164, an increase of 145, and Bristol, 10,345 a decrease of 18. The man hours worked showed a slight decrease, indicating a spread of employment.

NEW BRITAIN—**Landers, Frary & Clark** officials have incorporated as the **Stanley Insulating Company** with $100,000 authorized and paid in capital. Incorporation was solely for the purpose of accounting and was done since **Landers, Frary & Clark** brought its vacuum bottle production to the main plant from Great Barrington, Mass. about a year ago.

North & Judd Manufacturing Company has taken approximately $1,000,000 of group life insurance for its employees through the Travelers Insurance Co.

BRIDGEPORT — The **Bridgeport Engravers Supply Company** and the **Photo Engravers Copper & Zinc Grinders Association,** along with 10 other companies manufacturing and selling more than 90 per cent of the total volume of zinc and copper plates used for engraving purposes have been

cited by the Federal Trade Commission for unfair trade practices and to show cause why they should not desist from the practices alleged. The companies named are alleged to have entered into an agreement to restrict competition and fix uniform prices at which zinc and copper plates are to be sold and to cooperate in maintaining such prices through their trade association.

THOMASTON—Ralph Matthiessen, president of the **General Time Instruments Corporation,** holding company of the **Western Clock Company** of Illinois and the **Seth Thomas Clock Company** of this town, has announced that his organization has acquired the outstanding stock of the **Stromberg Electric Company** of Chicago. The latter produces time recorders, time stamps and secondary clock systems and, **Mr. Matthiessen** says, will be an admirable supplement to the **Seth Thomas Clock Company.**

The **Seth Thomas Clock Company,** it is understood, it not only protesting against the new trade agreement with Switzerland, which lets clocks into this country at a lower tariff, but also against Japanese trade practices in India. For a long time the local concern has had a lucrative trade there and its clocks have been the leading make. Japanese clock makers are cutting into it thereby building clocks which look exactly like Seth Thomas clocks and which are called "St. Thomas" clocks which sell for far less than the local products. It is feared that the tariff concession given Switzerland may be extended to Japan under the "most favored nation" clause.

Congressman J. Joseph Smith of this district has asked the State Department for an official interpretation to determine whether the reduction will apply to Japan. Competition with Switzerland is not feared, as that country manufactures few non-jewel watches and the clock concerns of this town, and others in the section make only such type of watches, but Japan does manufacture non-jewel watches in great numbers.

WINSTED—Walter V. Davey of this city and **Robert L. Noble** of New Haven are forming the **Dano Electric Company** and have filed articles of incorporation. It will manufacture electrical products especially coils and transformers. The capital will consist of $10,000 in preferred stock and 2,000 shares of common stock with no par value. Capital of $11,000 is already paid in. **Mr. Davey** will be president and secretary and **Mr. Noble,** vice-president and treasurer. **Mr. Davey** was general manager of the **Strand & Sweet Manufacturing Company** and developed its coil department. **Mr. Noble** was formerly with the **Acme Wire Company** of Hamden and was manager of the former **Polymet Manufacturing Company** of this city. The new concern will take part of the factory of the **Hudson Wire Company,** formerly the **Empire Knife Company** plant.—**W. R. B.**

Providence, R. I.

February 3, 1936.

Statistics released from various sources during this month relative to business and industrial activities in the closing month of 1934 show a healthy increase along all lines and form an encouraging factor as to business during the year just opened. Allowing for normal seasonal fluctuations, the new year starts with the brightest outlook in five years.

Payroll withdrawals from local banks by Rhode Island manufacturing establishments during the month of December, totalled $8,923,182 according to statistics compiled by the **Brown Business Research Bureau.** This figure is eight per cent greater than during the corresponding month of last year, but 3.5 per cent less than in the month of November this year, the decline, however, being largely seasonal. While the non-ferrous metal industries showed a drop of eight per cent in December as compared with the preceding month, it showed an increase of 39.7 per cent over the December figures for 1934. This year's December total was $172,216. The total of the jewelry and silverware industries for December was $918,346 or 9.2 per cent more than in December, 1934. It was, however, 16.7 per cent less than for the month of November.

Notice has been filed at the Secretary of State's Department that **The Ostby & Barton Company,** manufacturing jewelers of this city, has reduced its capital stock from $4,000,000 to $1,214,000.

Samuel M. Weinstein and **Frank Weinstein,** of 42 Brainard Road, Allston, Mass. have filed statement with the City Clerk's office that they are the proprietors of the **Narragansett Metal Company,** 388 South Main Street, Providence.

Findings Inc., of Providence has been incorporated under the laws of Rhode Island to conduct a manufacturing business in findings with an authorized capital consisting of 500 shares of common stock of no par value. The incorporators are: **Francis R. Bohrer** of Bronx, N. Y., **John E. Stone,** of Brooklyn, N. Y. and **Henry L. Fleischman** of New York City.

The **Universal Tube Manufacturing Corporation** of New York, has filed a statement with the Secretary of State's office here that its legal representative in Rhode Island is **Edwin O. Halpert,** attorney, 188 Martin Street, Pawtucket.

—**W. H. M.**

Middle Atlantic States

Utica, N. Y.

February 3, 1936.

The Chamber of Commerce of Utica in a bulletin issued this month reveals that business conditions in Utica and vicinity for 1935 were much better than the preceding year. Industrial employment in Utica for the fourth quarter of 1935 showed an improvement over the other quarters, the report states. Carloadings showed increases. December, 1935, totalled 20,350 compared with 18,478 for December, 1934.

An announcement on whether the Ilion plant of the **Remington-Rand Corporation** will be moved to Elmira is to be made shortly according to **Michael J. Walsh,** American Federation of Labor organizer for the Central New York section. Mr. Walsh said a national representative of the Union was taking the matter up with company officials.

A mortgage for $9,200,000 believed to be the largest ever recorded in Central New York was filed in the Oneida County Court House. It was issued by **Revere Copper & Brass, Inc.,** which operates plants in Rome and other cities to the National Bank & Trust Company of New York to secure an issue of first mortgage 4½ per cent sinking fund bonds of that amount. The bond issue will be used in connection with the proposed refinancing of the corporation according to the papers.

Harry S. Benjamin, Utica, is president of the newly organized **Selecto Sales Machines Company, Inc.** which expects to employ about 100 men to start in the former **Stromberg-Carlson** plant in Rochester. About a dozen machines patented and developed by Mr. Benjamin will be manufactured. Mr. Benjamin who has incorporated the concern for half a million dollars said he planned to manufacture, distribute and service the machines in all parts of the world. **Mr. Benjamin** is also president of the **Peerless Weighing Machines Company,** New York.—**E. K. B.**

Newark, N. J.

Conte Casket Company, of New York, has purchased a five-story factory building and several smaller structures on McClelland Street, formerly owned by the **McLaurin Jones Company.** The Conte concern manufactures metal caskets and other accessories for burial purposes.

The plant of the **American Type Founders Company,** 300 Communipaw Avenue, Jersey City, has been sold to the **Arvey Corporation,** an Illinois concern. Federal Judge Fake has signed an order approving the sale on application of the concern's reorganization trustees. The purchase price is $250,000.

A large unit of the **Manufacturers' Can Company,** Harrison, has been sold to the **National Oil Products Company.** A building having 50,000 square feet of floor space is involved. The can company also contemplates the sale of the balance of its property. The company's

business was sold six years ago to the **Continental Can Company,** operating a plant in Jersey City.—**C. A. L.**

Trenton, N. J.

New Jersey manufacturers are looking forward to a prosperous business season during 1936. At present there are 2.2 per cent more workers in New Jersey's industrial plants than in 1928, but they are making only 83 per cent as much money. **Walter Kidde,** president of the State Chamber of Commerce, says he expects a general rise in business and hopes that Congress will not pass any more "restrictive" laws. The Department of Labor reports a steady rise in factory employment.

The employees of the Trenton plant of the **Westinghouse Electric and Manufacturing Company** joined in the golden anniversary year celebration recently. The **Westinghouse Lamp Company** employees gathered in the Trenton Memorial building where a meeting was held and entertainment given. About 1,600 Trentonians participated including employees and their families.

The plant of the **John A. Roebling's Sons Company,** Trenton, was closed during the recent funeral of **Siegfried Roebling,** second vice president, who died suddenly from a heart ailment in California. Mr. Roebling flew to California and upon arrival was fatally stricken.—**C. A. L.**

Middle Western States

Detroit, Michigan

February 3, 1936.

While industrial conditions in this area have not been as active during the first month of the new year as expected, nevertheless production schedules are being well sustained. Furthermore the outlook continues encouraging—more so than has been experienced at this time of year since back in 1929.

Of course about everything centers around the motor car industry. Just how long the present activity may continue, no one knows, but it looks now as if it would hold until well into the early summer. All of the important plants are operating close to capacity. The same is true for the plating industry, also actively engaged on automobile work.

Automotive accessory plants, not only in the Detroit territory, but those in the vicinity are having about all they can do to keep up with demands. Practically all these plants are increasing their payrolls, a condition that is gradually reducing the welfare loads that have been oppressive for so long. Nevertheless it still is almost impossible for outside labor to get even a toe hold in any of the Detroit plants.

Activity in the refrigerator plants is fully as vigorous as it is in the motor car industry. The former concerns report continuous production over a long period, with the end no where in sight.

Producers of plumbing and steam heating supplies are doing better than they have for a long time. While none are rushed they are, however, making moderate progress.

Total shipments of electric units made by the **Leonard Refrigerator Company** during the last quarter of 1935, were 7,835, compared with 4,384 shipped in the same quarter of 1934.

The **Atomic Welders,** 111 Brady Street, has recently been incorporated by **Harry Sheldon.** The capital stock consists of 300 shares of no par value. The **Buckingham Products Company** also has been incorporated by **R. M. Buckingham,** 13934 Northlawn Avenue, to deal in buffing compound. The capital stock is $30,000. The **Argo Plating Company,** 4317 Grand River Avenue, is another new Michigan corporation instituted by **I. W. Parrish, Jr.** The capital stock consists of 1,000 shares of no par value.

The **Aluminum Corporation of America** has recently erected a brick and steel addition to its plant at 3311 Dunn Road. It provides additional space so much needed to handle its increased production.

The **Chevrolet Motor Company** during 1935 completed a $25,000,000 plant expansion program which has increased the production capacity of the organization's manufacturing and assembly plants by 25 per cent, it is stated. Detroit and Michigan shared largely in this vast expenditure.

The **Briggs Manufacturing Company** plant, in Hamtramck, a suburb of Detroit, was completely remodeled and equipped during 1935 for large scale production of plumbing ware. Huge kilns, conveyors and other special machinery for porcelain finishing were included in the program.

The **Automotive Parts & Equipment Manufacturers, Inc.,** at its annual meeting on Jan. 17, confirmed the following as elected to office:

Directors at large: **Vincent Bendix,** president, Bendix Aviation Corporation, Chicago; **Charles S. Davis,** president, Borg-Warner Corporation, Chicago; **M. C. DeWitt,** vice-president, Champion Spark Plug Company, Toledo; **Ben F. Hopkins,** president, Cleveland Graphite Bronze Company, Cleveland; **Lothair Teetor,** vice-president, Perfect Circle, Hagerstown, Ind.; **Hugh M. C. Weed,** vice-president, Carter Carburetor Company, St. Louis; and **C. E. Wilson,** vice-president of General Motors Corporation, Detroit.—**F. J. H.**

Pacific States

Los Angeles, Calif.

February 3, 1936.

The **Douglas Aircraft Company** of Santa Monica has received a contract from the government for the building of ninety all-metal monoplanes, costing $6,500,000.

The **Northrup Corporation** of Inglewood has a government contract to build 100 all-metal attack planes, besides that thousands of various parts.

The **Douglas Aircraft Company** of Santa Monica has let contracts for large extensions to the plant, a foundry, an engineering building, the world's largest airplane hangar building; all-steel, to be 285 x 300 feet in size; total cost of improvements $650,000.

The **Pacific Scientific Company** here, will enlarge; making scientific instruments.

The **Technicraft Company** of Vernon, will build a factory, to operate in metal lines at south end of Soto St.

The **Globe-Union Company,** of Milwaukee, has taken 50,000 square feet in the Central Manufacturing District, on District Blvd., and will put up a $100,000 plant, for the making of batteries, spark plugs, roller skates, etc. **C. O. Wanvig** is president and they will employ 100 hands.

A new factory here is the **West Coast Bak-A-Namel Company;** to build a 20,000 square foot plant at 3205 South Grand Ave., **S. A. Harrison** is general sales manager; **W. W. Dresser** is general manager. They will finish automobiles in any color, or combination of colors, to last indefinitely. The plant will have a capacity of thirty-three cars a day. They will install a large forty foot oven for refinishing and will also work in various metal lines.

Victor Pastushin has organized the Pastushin Air Tray Company at Santa Monica, to make toy metal transport planes.

The **Westelectric Casting Company** will enlarge their factory, working in metals, at 1610 Canfield Ave.

The **Advance Aluminum & Brass Company** have moved their factory to 1001 East Slauson Ave. and will greatly enlarge their output.

The **Vernon Foundry** will put up some new buildings at 1721 North Industrial Ave., at Vernon.

The **Forrest Stove Works** have put up a new factory at 36th Place and Vermont Ave., to make stoves and ranges.

The **Stanley Meter Company,** is a new firm making gasoline meters, at 6620 McKinley Ave.

The **Peerless Novelty Company** is a new firm at 5882 South Broadway, to manufacture belt buckles and novelties.

—**H. S.**

Metal Market Review

February 3, 1936.

Copper was unchanged through the month at 9.25c per pound for electrolytic. Business was quiet during the first week—the holiday period. Sales figures increased in the second, to 11,400 tons; the third was 8,500 tons and the fourth about 5,300 tons, making a total of over 28,000 tons for January. This compared with December sales of over 40,000 tons, November, 32,000 tons and October, 66,500 tons. The foreign market fluctuated but ended on the firm side.

Zinc was also unchanged throughout the month at 4.85c per pound, Prime Western, f.o.b. E. St. Louis. After a dull first week, the demand improved somewhat, remainder steady until the latter part of the month, when offerings of zinc through second hands were made at slight concession which caused some uncertainty about the price situation. Some business was reported at 4.80.

An interesting Review of the Zinc Industry was written by **E. V. Gent,** secretary of the **American Zinc Institute** which covered American production, consumption, stocks of metal, prices, research and sales promotion, noted the increased use of zinc alloy die castings and other industries which take this metal in quantity. Mr. Gent's review closed with the statement: "With consumption ahead of production and stocks at a low level, conditions in the zinc industry appear to justify a more cheerful outlook than for some years past."

Tin was unsteady. Beginning the month at 48.25c per pound for Straits it slipped to 46, but rose again rather sharply in the last few days to its high for the month, 48.375. The month was featureless, business being fair to quiet with no developments of importance.

Lead was another "pegged" metal, remaining at 4.35c per pound f.o.b. St. Louis. After moderate sales during the first week, business rose to 6,500 tons in the second, receded to 4,750 tons in the third and jumped again to 11,900 tons in the fourth. The cable makers are said to have been showing more interest and the prospects for business from this quarter and other large consumers are favorable.

Aluminum and **Nickel** were, as usual, set at 22c per pound and 35c per pound electrolytic, respectively.

Antimony was reactionary. It opened at 14c per pound, went immediately to 13.75 and then on January 12th, dropped to 12.625 where it remained until the last few days, closing at 12.75.

Silver was a prominent weak sister. Starting at 49.75c per ounce, a new low for several months, it receded to 48.75, on January 16th. It dropped 3 cents more the next day; 1c more the day after and closed the month at that figure, 44.75. Silver-using manufacturers will do well to read the Annual Review published by Handy and Harman which is discussed on page 63 of this issue.

Platinum was weakish, slipping from $36 per ounce to $34, and at the last to $33.00.

Gold—unchanged at $35.00 per ounce, U. S. Treasury price.

Scrap Metals began rather weakly with refiners cutting bids for auto radiators from 10 to 15 points, with offerings fair. Shipments of brass ingot and aluminum picked up slightly in the second week. Offerings to refiners declined in the face of another 10 point cut. Bookings of brass ingots were light but in secondary aluminum they held up very fairly. Refiners cut bids again on radiators but held firm on other items. Ingot buying became slow and aluminum demand slowed up also. During the last week, copper scrap offerings declined sharply; at the same time ingot brass bookings continued very light and it was reported that some sales were made at figures below price quotations in the west.

The combined deliveries of brass and bronze ingots and billets by the members of the Non-Ferrous Ingot Metal Institute for the month of December, 1935, amounted to a total of 5,894 tons.

Average prices per pound received by its membership on Commercial Grades of six principal mixtures of Ingot Brass during the twenty-eight day period ending January 24:

80-10-10 (1½% Impurities)	10.806c
79% Metal	8.502c
81% Metal	8.762c
83% Metal	9.022c
85-5-5-5	9.306c
No. 1 Yellow Brass Ingot	7.539c

Wrought Metal Market

The brass mills experienced their usual seasonal lull, but employment and operations were consistently above the same period of last year. A large Metropolitan distributor reports January, 1936 at 25% over December, 1935 and 40% over January, 1935.

Daily Metal Prices for January, 1936

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1*	2	3	6	7	8	9	10	13	14	15	16	17
Copper c/lb. Duty 4 c/lb.													
Lake (del. Conn. Producers' Prices)	....	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375
Electrolytic (del. Conn. Producers' Prices)	....	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25
Casting (f.o.b. ref.)	....	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)	....	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	....	48.25	47.625	47.00	47.00	47.125	47.125	47.25	47.875	47.75	47.625	47.60	47.35
Lead (f.o.b. St. L.) c/lb. Duty 2⅛ c/lb.	....	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35
Aluminum c/lb. Duty 4 c/lb.	....	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%	....	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	....	14.00	13.75	13.75	13.75	13.75	13.75	12.625	12.625	12.625	12.625	12.625	12.625
Silver c/oz. Troy, Duty Free	....	49.75	49.75	49.75	49.75	49.75	49.75	49.75	49.75	49.75	49.75	48.75	45.75
Platinum $/oz. Troy, Duty Free	....	36.00	36.00	36.00	36.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
Gold—Official Price[1] $/oz. Troy	....	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

	20	21	22	23	24	27	28	29	30	31	High	Low	Aver.
Copper c/lb. Duty 4 c/lb.													
Lake (del. Conn. Producers' Prices)	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375
Electrolytic (del. Conn. Producers' Prices)	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25
Casting (f.o.b. ref.)	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	46.875	46.85	46.00	46.125	46.40	46.25	46.50	48.15	48.125	48.375	48.375	46.00	47.237
Lead (f.o.b. St. L.) c/lb. Duty 2⅛ c/lb.	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35
Aluminum c/lb. Duty 4 c/lb.	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	12.625	12.625	12.625	12.625	12.625	12.625	12.625	12.75	12.75	12.75	14.00	12.625	12.960
Silver c/oz. Troy, Duty Free	44.75	44.75	44.75	44.75	44.75	44.75	44.75	44.75	44.75	44.75	49.75	44.75	47.250
Platinum $/oz. Troy, Duty Free	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	33.00	36.00	33.00	34.318
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

[1] U. S. Treasury price. * Holiday.

Metal Prices, February 3, 1936

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.375, Electrolytic, 9.25, Casting, 8.95. Zinc: Prime Western, 4.85. Brass Special, 4.95. Tin: Straits 48.125. Pig 99%, 46.25. Lead: 4.35. **Aluminum,** 22.00. **Antimony,** 12.875. **Nickel: Shot, 36. Elec., 35.**

Quicksilver: Flasks, 75 lbs., $78.00. **Bismuth,** $1.00. **Cadmium,** $1.05. **Silver,** Troy oz., official price, N. Y., February 3, 44.75. **Gold:** Oz. Troy, Official U. S. Treasury price, February 3, $35.00. **Scrap Gold,** 6¾c. per pennyweight per karat, dealers' quotation. **Platinum,** oz. Troy, $33.00.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free, lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U S. Import Duty	Tax*
No. 1 Yellow Brass	7.75	None	4c. lb.[1]
85-5-5-5	9.50	None	4c. lb.[1]
88-10-2	12.50	None	4c. lb.[1]
80-10-10	11.00	None	4c. lb.[1]
Manganese Bronze (60,000 t. s. min.)	9.75	None	4c. lb.[1]
Aluminum Bronze	13.75	None	4c. lb.[1]
Monel Metal Shot or Block	28	25% a.v.	None
Nickel Silver (12% Ni)	11.50	20% a.v.	4c. lb.[1]
Nickel Silver (15% Ni)	15.00	20% a.v.	4c. lb.[1]
No. 12 Aluminum	16.50-20	4c. lb.	None
Manganese Copper, Grade A (30%)	18-23	25% a.v.	3c. lb.[1]
Phosphor Copper, 10%	11.25-14	3c. lb.	4c. lb.[1]
Phosphor Copper, 15%	13.25-15	3c. lb.	4c. lb.[1]
Silicon Copper, 10%	18.30	45% a.v.	4c. lb.[1]
Phosphor Tin, no guarantee	61-75	None	None
Iridium Platinum, 5%	$37	None	None
Iridium Platinum, 10%	$38	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6¾ to 7	Free	4c. per pound on copper content
Light copper	6 to 6¼	Free	
Heavy yellow brass	4¼	Free	
Light brass	3.50 to 3.75	Free	
No. 1 composition	6	Free	
Composition turnings	5⅞	Free	
Heavy soft lead	3⅝ to 3¾	2⅜c.lb.	None
Old zinc	2.85 to 3.00	1½c.lb.	
New zinc clips	3.85	1½c.lb.	
Aluminum clips (new, soft)	14 to 14.25	4c.lb.	
Scrap aluminum, cast	11.75 to 12	4c.lb.	
Aluminum borings—turnings	6¼ to 6½	4c.lb.	
No. 1 pewter	29 to 30	Free	
Electrotype	3.75 to 4	2⅜c.lb.*	
Nickel anodes	29½ to 31	10%	
Nickel clips, new	32 to 33	10%	
Monel scrap	12 to 18	10% a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since January 13, 1936. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	16½c.	2½c. lb.
Bare wire, soft, less than carloads	13 c.	25% a. v.
Seamless tubing	17 c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	14⅝c.	15½c.	16⅜	4c. lb.	U. S. Import Tax 4c. lb. on copper content.
Wire	15⅛c.	16 c.	16⅞	25%	
Rod	13⅛c.	16 c.	16¾	4c. lb.	
Angles, channels	22⅝c.	23¾c.	24⅜	12c. lb.	
Seamless tubing	16⅞c.	17½c.	18⅜	8c. lb.	
Open seam tubing	22⅝c.	23¾c.	24⅜	20% a.v.	

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	23⅞c.	10% Quality	26¾c.
15% Quality	26 c.	15% Quality	31⅛c.
18% Quality	27¼c.	18% Quality	34⅜c.

TOBIN BRONZE AND MUNTZ METAL

Net base prices per pound. (Duty 4c. lb.; import tax 4c. lb. on copper content.)	
Tobin Bronze Rod	16¾c.
Muntz or Yellow Rectangular and other sheathing	17⅞c.
Muntz or Yellow Metal Rod	14¼c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.80
Aluminum coils, 24 ga., base price, ton lots, per lb.	30.50

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	49c.	Cold Rolled Sheet	53c.
Hot Rolled Rods	44c.	Standard Sheet	48c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	34	Standard Sheets (base)	38
Cold Drawn Rods (base)	39	Cold Rolled Sheets (base)	43

SILVER SHEET

Rolled sterling silver (February 3) 45c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

Cents per lb.	Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	8.00	2⅜c. lb.
Cut Lead Sheet (base price)	8.25	2⅜c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty Free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 86.

Supply Prices, February 3, 1936

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets

Copper: Cast	16½c. per lb.	**Nickel:** 90-92%	.45 per lb.
Electrolytic, full size, 14¼c. cut to size	14¼c. per lb.	95-97%	.46 per lb.
Rolled oval, straight, 14¾c.; curved,	15¾c. per lb.	99%+cast, 47c.; rolled, depolarized, 48.	
Brass: Cast	14¾c. per lb.	**Silver:** Rolled silver anodes .999 fine were quoted February 3, from 48c. per Troy ounce upward, depending on quantity.	
Zinc: Cast	10⅛c. per lb.		

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

Any Quantity

4 to 6	Under ½, $5.00	½-1, $4.85	1 to 3, $4.75
1½ to 4	" 5.55	" 5.40	" 5.35
1 to ½	" 5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick. On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less are quoted:

16" 20 ply 84/92 Unbleached	$71.13
14" 20 ply 84/92 Unbleached	54.58
12" 20 ply 84/92 Unbleached	41.09
16" 20 ply 80/92 Unbleached	59.37
14" 20 ply 80/92 Unbleached	45.64
12" 20 ply 80/92 Unbleached	34.45
16" 20 ply 64/68 Unbleached	51.26
14" 20 ply 64/68 Unbleached	39.47
12" 20 ply 64/68 Unbleached	29.86
⅜" Sewed Buffs, per lb., bleached or unbleached	48c. to 1.12

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	**lb.**	.11¼-.16
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.05¼-.05¾
Chromic, 400 or 100 lb. drums		.16¼
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.12½-.13½
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.03½
Powdered, barrels	lb.	.0340-.0365
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23- 41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.0245-.0295
Cadmium oxide, 50 to 1,000 lbs.	lb.	.85
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	21½-23½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.21
Carbonate, 53/55% cu., bbls.	lb.	.15½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	4.55-5c.
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.,	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) Pure, drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.13½-.14½
Salts, double, 425 lb. bbls.	lb.	.13½-.14½
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07¼-.08½
Potassium—Bichromate, casks (crystals)	lb.	.09
Carbonate, 96-98%	lb.	.07½
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Gold Cyanide	oz.	$15.45*
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.38
Cyanide, 100 oz. lots	oz.	.45-.50
Nitrate, 100 ounce lots	oz.	.32¾
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.17½-.22
Gold Cyanide	oz.	$17.10*
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.15-3.30
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.0350
Silicate (Water Glass), bbls.	lb.	.01½
*Stannate, drums	lb.	.31-.34
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
*Tin Chloride, 100 lb. kegs	lb.	.36
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Cyanide (100 lb. kegs)	lb.	.38
Chloride, drums, bbls.	lb.	.07½-.10
Sulphate, bbls.	lb.	.028-.037

*Subject to fluctuations in metal prices.